

GETTING ENGAGED:
FACEBOOK AND THE FIRE SERVICE

By

JAMES R. ALESKI

Bachelor of Science of Mass Communications

Emerson College

Boston, MA

1996

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
July 2016

GETTING ENGAGED:
FACEBOOK AND THE FIRE SERVICE

Thesis Approved:

Dr. Tristan Wu, Thesis Advisor

Dr. Hsien-Ho (Ray) Chang, Committee Member

Dr. Haley Murphy, Committee Member

ACKNOWLEDGEMENTS

I would like to acknowledge the guidance, patience, and encouragement given to me by my committee chair and advisor Professor Tristan Wu. You quite literally rescued this project from an early demise! Also, thank you to my other committee members, Professor Hsien-Ho (Ray) Chang and Professor Haley Murphy, as well as previous advisors Professor Brenda Phillips and Professor Will Focht. Additional advice and countless thanks are shared with many other Fire and Emergency Management Program (FEMP) colleagues and friends, including (but certainly not limited to) D.M. Bennett, Peter Berger, Caroline Hackerott, Kristen Kulling, Professor Dave Neal, Alyssa Provencio, Cindy Webster, and Maria Wegner.

I also acknowledge many mentors and friends in the fire service, especially at the Cherry Hill Fire Department, for the continual encouragement and allowing me to essentially use the agency's social media platforms as a laboratory for several years. Special thanks go to Bob Giorgio, Tom Kolbe, Montrell Haldeman, Chris Callan, Rick Harris, Harry Cranmer, Art West, Bill Arcari, Wade Houlihan, Phil Cook, Zach Houck, Rob Luft and the members of my various companies over the years for putting up with my seemingly endless studies.

Acknowledgements also go out to the many ground-breaking #SMEM colleagues I have learned from throughout the world over the years, including, but certainly not limited to Patrice Cloutier, Brian Humphrey, Jeff Phillips, Emily Rahimi, and Kim Stephens.

I could not have finished this project or my degree without the help of my family, including my parents, Carol and Richard Aleski, sister Kimberly Richardson, in-laws Rosalie and Edward Miller, and sister-in-law Sherry Miller.

And finally, my deepest gratitude goes to my wife Karen and sons CJ and Max. Along this lengthy journey, your sacrifices have been much greater than my own.

Thank you all very much.

Name: James R. Aleski

Date of Degree: July 2016

Title of Study: Getting Engaged: Facebook and the Fire Service

Major Field: Fire and Emergency Management Administration

Abstract: Various crisis situations around the world are repeatedly proving the critical impact of social media usage during these times. American fire departments are recognizing the strengths of these tools and are rapidly expanding their usage of them during both emergency and non-emergency periods. While research on social media usage during disasters is expanding, much less is known about how the fire service can use these applications on a day-to-day basis. This study conducts analyses on fire departments' official Facebook pages to determine what they are posting and what factors influence the amount of engagement in the forms of likes, comments, and shares, these posts receive. The results show that (1) posts disclosing information about a fire department's history, its people, and the actions and activities they take part in get the most likes and comments overall, (2) content that provides general community information, public service announcements, or situational awareness gets the fewest number of likes and comments, (3) however, among these types of posts, general community information gets more likes than public service announcement or situational awareness, (4) posts that contain content shared from other Facebook pages receive fewer likes and comments than posts that do not contain shared content, (5) posts made between 10pm and 2am receive more shares than content posted at other times, and (6) posts containing images receive more likes and comments than posts not containing images. These findings can offer guidance to fire departments on how to better engage their followers and foster relationships via Facebook on a day-to-day basis.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
II. REVIEW OF LITERATURE.....	5
2.1 Facebook	5
2.2 Goals and Tactics	7
2.3 Content	17
2.4 Research Questions	20
III. METHODOLOGY	24
3.1 Sampling	24
3.2 Coding	26
3.3 Analytical Methods	30
IV. RESULTS	32
V. DISCUSSION & CONCLUSION	41
5.1 Discussion	41
5.2 Conclusion	45
REFERENCES	49
APPENDICES	58
Appendix A Figures	58
Appendix B Tables	62

LIST OF TABLES

Table	Page
5-1 Summary of significant results	45
B-1 Inter-coder reliability for content coding (3 coders).....	62

LIST OF FIGURES

Figure	Page
3-1 Geographical dispersal of sample (plus Fairbanks, AK)	26
4-1 Mean likes by main content categories.....	33
4-2 Mean comments by main content categories.....	34
4-3 Mean likes by information subcategories	35
4-4 Mean likes for content containing shares from other Facebook pages.....	36
4-5 Mean comments for content having shares from other Facebook pages.....	37
4-6 Mean shares by time of post	38
4-7 Mean likes by contains image	39
4-8 Mean comments by contains image.....	40
A-1 Included cities by population.....	58
A-2 Numbers of followers by city (as of 2/1/15).....	59
A-3 Coding instructions for inter-coder reliability reviewers.....	60

CHAPTER I

INTRODUCTION

Research on public safety agency usage of social media is expanding rapidly (Latonero and Shklovski, 2010). Applications such as Facebook, Twitter, YouTube, Flickr, and Pinterest are repeatedly proving their usefulness as collaboration and coordination tools during crisis (Dufty, 2013; Bird, Ling and Hayes, 2012; Bonson, Royo, and Ratkai, 2015; Dabner, 2012; Sheil, Violanti, and Slusarski, 2011). These uses include listening to and managing stakeholder needs and expectations (Wardell and Su, 2011; Alexander, 2014); increasing situational awareness and informing both emergency responders and residents about local conditions (Houston et al., 2014); and organizing and empowering citizens as force multipliers (Wardell and Su, 2011).

After the 2010 Haiti earthquake, Keim and Noji (2011) found social media to be supporting all of these functions. The 2011 earthquake and tsunami in Japan saw social media tools used extensively to document and share the aftermath of those extreme events (Hjorth and Kim, 2011). The 2011 Virginia earthquake saw people sharing information about the event immediately as it was happening. In some cases, messages on social media were spreading faster than the tremors of the earthquake itself (Houston et al., 2014).

Stakeholders are increasingly *expecting* their local emergency service agencies to use these applications. A 2010 American Red Cross survey reveals 69% of respondents feeling that emergency response agencies should regularly monitor their social media sites so they can respond quickly to requests posted there (Wardell and Su, 2011). During the 2011 floods in Queensland, Australia, local governments saw their number of Facebook followers increase by 16 times (759 to 12,679) (McLean and Power, 2013).

Formal emergency management as known today in the United States largely started as civil defense wartime response functions. By 1979, the Federal Emergency Management Agency (FEMA) was founded and these functions moved into a more comprehensive, all-hazards management approach (Coleman and Granito, 1988). This approach formally includes dozens of resources and agencies at all levels of government.

Managing emergencies, whether routine or complex, most commonly occurs, however, at the local level of government. Local emergency services agencies, such as police and fire departments are in a constant state of readiness or response (Latonero and Shklovski, 2010). Due to the expanding scope of services provided by most fire departments, these agencies are becoming involved in an increasing range of emergency types and situations (Fleming and Zhu, 2009). Most of these incidents share common requirements, one of which is being able to effectively communicate with stakeholders (Coleman and Granito, 1988; Houston et al., 2014).

Although slow to initially accept, fire departments are finding social media to hold tremendous opportunity for communicating with their communities during both emergency and non-emergency times (Murphy, 2013; Sheil, Violanti, and Slusarski,

2011). Guidance on fire service Facebook usage, however, remains limited (Sheil, Violanti, and Slusarski, 2011). The large variances in staffing resources and stakeholders served in different communities leads to few “right way” methods and organization (Wardell and Su, 2011; Hughes et al., 2014). Simply creating Facebook profile for an agency is not an effective way to create an online relationship with stakeholders (Bortree and Seltzer, 2009; Waters et al., 2009; Waters et al., 2011; Bonson, Royo, and Ratkai, 2015). Organizations need to know how these tools work, including how to best engage stakeholders. Following other peer agencies and passively monitoring their best practices and successes is a common way to learn (Mergel, 2013). Creative ad hoc usage is another common way to see what works and what does not (Latonero and Shklovski, 2010).

The Protective Action Decision Model (PADM) is a multistage model based on people’s behavior when facing disasters or environmental hazards. It includes environmental cues, social cues, and warnings at the beginning of its process (Lindell and Perry, 2012). These threat cues and warnings, when received and understood, lead to changes in protective behavior (Latonero and Shklovski, 2010; Lindell and Perry, 2012). It is critical, therefore, for emergency services agencies to understand how to communicate effectively threat information to their stakeholders before they are at risk. Lindell and Perry (2012, 627) describe this period as the “continual hazards phase” and the time to best develop various risk communication strategies.

While emergent situations encourage stakeholders to seek out information from official emergency services agencies, non-emergency times can prove challenging for attracting an audience. This is a critical weakness in that the “principle of continuity”

suggests that behavior prior to a crisis, including that of organizations, will likely carry over during and after one (Quarantelli and Dynes, 1977, 34). Change after a crisis is unlikely unless efforts to initiate those changes were underway prior to the event. It is critical, therefore, for relationships to develop during non-event times that seek to change people's behavior. Facebook utilization by fire agencies holds the potential to foster these relationships.

CHAPTER II

REVIEW OF LITERATURE

2.1 Facebook

The earliest incarnations of Internet go back to the 1960s. These were limited, closed networks developed in several countries for mostly research and military purposes. With the launch of the World Wide Web in 1990, the Internet became increasingly accessible to the lay public. One, single website in 1991 grew to more than 17 million by 2000. By 2014, there were nearly a billion sites hosting content from all over the world (InternetLiveStats.com, Web).

The makeup and usage of these sites evolved considerably over this time. Now referred to as “Web 1.0,” interaction with early sites was similar to picking up a traditional form of printed media – a passive way to consume unidirectional content (Ramanadhan et al., 2013; Hesse et al., 2011; Lovejoy and Saxton, 2012; Waters and Lo, 2012). As the Internet evolved, it became a much more participatory (Hesse et al. 2011, 13). This shift, now known as “Web 2.0,” also saw the birth of social media sites (Ramanadhan et al., 2013). These include Twitter, Instagram, Google +, YouTube,

Flickr, and LinkedIn. They also include Facebook, the most popular social networking application in the world.

As of December 2015, Facebook reported more than 1.59 billion monthly and 1.04 billion daily active users worldwide (Newsroom.fb.com, 2016). By early 2016, nearly 67% of American adults had Facebook accounts (Gottfried and Shearer, 2016). Facebook has the highest levels of engagement among social media users, according to Bonson, Royo, and Ratkai (2015). More than 60% of account holders visit at least once a day, with nearly 40% visiting multiple times a day (Bonson, Royo, and Ratkai, 2014). The average user spends 55 minutes a day on the site (Waters et al., 2011).

People visit Facebook for a variety of reasons. They exchange messages with other individual users. They post messages or pictures for all their followers to see. They simply passively read their newsfeeds, which are a mix of posts from individuals, professional media outlets, and countless other representations.

In addition to personal profiles, Facebook also features pages. These allow non-individuals, such as companies, organizations, or government agencies, to have a presence on the site. They allow for an online presence whether their administrators are actively posting to the site or not. Other users can view and interact with previously shared content at their own leisure (Farquhar, 2012). Organizations use pages for establishing online communities, branding, and marketing (Murphy, 2013). Shared content is carefully curated and selected in order to present an “ideal” representation, allowing agencies to maintain a high level of control over their online image (Farquhar, 2012; Kaplan and Haenlein, 2009). Pages can provide a social presence, reduce

ambiguity and uncertainty in communications, and allow for self-presentation and disclosure (Kaplan and Haenlein, 2009). Ellison and Hardy (2014) found, however, that at this point, local government pages do not typically elicit in-depth political discussion, but merely conversations about the quality of services provided by local agencies.

2.2 Goals and Tactics

The low-cost and direct communication abilities of Facebook pages have proven very popular with commercial brands, non-profits, and government agencies (Waters and Lo, 2012; Gummerus et al., 2010; Ellison and Hardy, 2014). They offer practical benefits, such as ease in sharing information, social facilitation, and entertainment. All of these can be effective ways of engaging followers and keeping them connected (Gummerus et al., 2010).

The “Open Government Initiative” of the U.S. Federal Government encourages executive agencies to embrace digital communications technologies and share information with the public online (Obama, 2009; Mergel, 2013). This movement is rapidly expanding in state and local level government, as well. In their study of e-government, Norris and Reddick (2012) found 67% of local governments had adopted use at least one social media platform as of 2011. Of these, 92.4% had started a Facebook page (Norris and Reddick, 2012). Ellison and Hardey (2013) find Facebook to offer the most potential for sustained interaction between local government agencies and their stakeholders.

The fire service, largely a local government responsibility, is slowly following this trend. The Los Angeles Fire Department launched public social media accounts by

2007 (Humphrey, 2016). The Fire Department of the City of New York had a social media presence by late 2009 (Rahimi, 2016). Smaller agencies such as the Cherry Hill (NJ) Fire Department and Surf City (NJ) Volunteer Fire Company started in early 2010.

Sheil, Violanti, and Slusarski (2011) found the majority (66.7%) of fire departments they surveyed now use social media. In their study of social media use during Hurricane Sandy, Hughes et al. (2014) found Facebook to be the most common type of fire service social media account. Among the 568 fire departments located within 100 miles of where the storm made landfall in southern New Jersey, nearly 70% had Facebook pages (Hughes et al., 2014).

Murphy (2013, 175) describes Facebook as a “communication channel” much different than traditional forms of websites. In some cases, Facebook and other social networking platforms are becoming primary ways for audiences to consume media content. This consumption includes not only entertainment, but also national and local news. A majority of American adults receive news from social media, with two-thirds of Facebook users getting news on the site (Gottfried and Shearer, 2016). Murphy (2013) describes this phenomenon as a major shift away from traditional media outlets, such as print, radio and television.

During times of crisis, traditional media sources such as television and radio are still the dominant sources of information (Houston et al., 2014; Lin et al., 2013). Social media usage, however, is rapidly expanding during these times (Latonero and Shklovski, 2010). For example, Wu et al. (in press) found that people with higher education and

income statuses used social media as their secondary information source during 2013 Colorado Flood emergency.

This is an important and critical change as these technologies have become mainstream forms of communication for nearly all population demographics that fire agencies serve (van Dijck and Poel, 2013). More critically, some subsets of stakeholders, such as younger populations, use social media tools as their primary sources of information and communication (Waters et al., 2011). Social networking sites may be the *only* form of media that reach some parts of the population (Mergel, 2013; Bonson and Ratkai, 2013). It is critical that public safety agencies know how to reach these audiences on a day-to-day basis.

Little research exists as to the influence different types of content have on stakeholder interaction with government agency Facebook pages (Bonson, Royo, and Ratkai, 2015). Mergel (2014) finds three missions government agencies have when utilizing social media tools. The most common is increasing transparency. It involves having a social media presence that simply pushes out one-way information and represents the agency online (Mergel, 2013; Mergel, 2014; Ellison and Hardy, 2014).

Information is a critical part of raising accountability and trust between agencies and stakeholders (Mergel, 2014; Bonson, Royo, and Ratkai, 2015; Skokan, 2005; Waters et al., 2009). Information disclosure can help an organization increase social legitimacy (Bonson, Royo, and Ratkai, 2015). Social media tools can highlight the risks a community faces and illustrate how those risks are being managed (Dufty, 2013). The availability of accurate, credible and pertinent information helps people enhance their

perceptions of risk and make appropriate decisions to protect themselves from that risk (Lindell and Perry, 2012; Lin et al., 2013).

The ability to communicate information directly about fire service activities comes a critical time for American fire departments. Agencies continue to see the types of emergency responses with which they are tasked changing rapidly. In most places, fire extinguishment calls are down dramatically. Overall responses, however, are up more than 2.61 times nationwide between 1980-2010 (Evarts, 2011).

All-hazards approaches bring tremendous changes in response types. Emergency medical responses now commonly constitute as much as 80% of run volumes (Walters, 2011). Hazardous materials assignments, technical rescue, homeland security, and emergency management are now common standard responsibilities across the nation (Fleming and Zhu, 2009). Climate change related preparation and responses are growing rapidly (Dufty, 2013). In some places, fire departments are even providing proactive medical, mental health and social work services (Cacciatore et al., 2011).

Costs to provide these services are rising considerably as is the increasing competition for resources at the local level of government (Karter and Stein, 2012; Hall, 2014). With fires down and costs up, American fire departments are facing significant political, economic, and public relations challenges. The majority of fire department expenses are for personnel and equipment. In most places, the primary function of these resources is fire extinguishment (Hall, 2014). As local budgets become tighter, fire departments find themselves increasingly having to justify growing expenses while likely fighting fewer actual fires (Karter and Stein, 2012).

Transparency and external communication are often low priorities for public safety agencies. Ramanadhan et al. (2013) find participatory approaches uncommon among community based organizations, with command and control approaches the tradition. The fire service continues to be among the most popular and well-regarded divisions of American government (Miller and Miller, 1991). These favorable public opinions often lead outreach efforts to be taken for granted. This situation results in the public not knowing what their fire department routinely does and fire departments not knowing what the public expects or needs (Wallace, 2006). Social media tools such as Facebook offer the opportunity for fire departments to inform their stakeholders exactly what it is they do on a regular basis and what risks the community faces, even if the threat from fire is down. Facebook easily allows for basic engagement metrics to be seen via the number of followers a page has, and the number of likes a post receives (Mergel, 2014).

Mergel (2013; 2014) also discusses participation as another common government social media mission. Interactivity is a critical part of online relationships (Waters et al., 2009). Participation and interactivity requires engagement. Gummerus et al. (2012) describe engagement as involving loyalty and behavior manifestations. Vivek, Beatty, and Morgan (2012, 127) define engagement as “the intensity of an individual’s participation in and connection with an organization’s offerings or organizational activities.”

Engagement requires establishing two-way interaction (Olsen and Shindler, 2010; Schultz and Peltier, 2013; Mergel 2013; Mergel 2014). It involves both pushing information out and listening to or pulling information in (Schultz and Peltier, 2013; Shen

and Bissell, 2013). Two-way communication helps build and maintain trust and make citizens feel empowered (Olsen and Shindler, 2010; Kweit and Kweit, 2004; Granito, 1988; Lachapelle and McCool, 2012; Schultz and Peltier, 2013; Latonero and Shklovski, 2010).

Citizens tend to pay little attention to their local government services as long as provided services are considered adequate (Stipak, 1979). Dedicated and organized outreach efforts can help overcome this passiveness. These efforts should involve some long-term, reciprocal value being developed (Schultz and Peltier, 2013). They allow for feedback and insights as to what effects agency operations may be having in the community (Bordua and Tifft, 1971).

Understanding engagement is critical for the fire service. It is an essential part of providing effective customer service and satisfaction, two factors considered vital for maintaining public support (Schultz and Peltier, 2013; Wallace, 2006). Clary (1985) discusses how successful hazard mitigation policy implementation often requires not only physical technologies but social ones as well. Engagement between fire departments and stakeholders can lead to improved safety education endeavors (McCaffrey, 2004). It can even increase morale among department members (Halvorsen, 2003). Pulling information allows for “crisis mapping,” or the sourcing situational awareness information directly from the affected public (McLean and Power, 2013; Wendell and Su, 2011).

Designed for engagement and two-way interaction, social media tools help make information exchange more democratic (Shen and Bissell, 2013). They can help form

and strengthen connections (Gummerus et al., 2012; Nair, 2011; Parsons, 2013). They can be used to link with vulnerable members of the community that are often hard to reach and most at risk during emergencies (United States Fire Administration, 2013; Runyan et al., 1992). These populations, including the elderly, children, and people living with disabilities, are increasingly using Facebook and other social media tools (Duggan et al., 2015; Emergency Access Advisory Committee, 2011; Power et al., 2006; Lenhart, 2015; Schurigin O’Keeffe, Clarke-Pearson, and Council on Communications Media, 2011). The explosion in smart phone usage has helped fuel this rapid growth of social media use and help narrow the digital divide that certain populations have traditionally faced (Ramanadhan et al., 2013; Smith, 2015; Power et al., 2006).

Agencies can engage, via social media, populations who are connected and have them pass information onto those, such as elderly family members, who may be less connected (Mitchell et al., 2008). This process is especially critical for connecting with immigrant families who may be less trusting of government sources (Mitchell et al., 2008; Eisenman et al., 2007). Children can also act as translators (Mitchell et al., 2008). Connections with young stakeholders can lead to linkages with large community networks such as schools, scout groups, religious clubs, and sports teams.

It can be challenging for public safety organizations to fit into such a people centric and interactive medium (Dufty, 2013; Boivard, 2007). An active agency Facebook page shows commitment to being where citizens communicate (Bonson, Royo and Ratkai, 2015; Mergel, 2013). Interactivity helps keep people’s attention (Waters et al., 2011). These interactions allow agencies and citizens the chance to learn more about

each other. These relationship-building processes are the foundations for advanced types of online interaction.

Advanced social media relationships allow for what Mergel (2014) describes as collaboration, a third common government agency social media mission. This requires not only two-way communications, but also interactive exchange. It involves discussions, networking, and mutual content sharing between agencies and stakeholders (Mergel, 2013; Mergel 2014).

These exchanges are critical during crises; as people look to multiple sources of information to help them make decisions (McLean and Power, 2013). The PADM describes a feedback loop of various environmental cues, social cues, and official warnings (Lindell and Perry, 2012). Sources can include personal experience, local authorizes, local news media, national news media, the Internet, and peers (Lin et al., 2013). Updates from familiar sources, such as local media and or government agencies, are often more trusted than information from national media or Federal or State government (Lachapelle and McCool, 2012; McLean and Power, 2013).

Some of the most trusted information comes from within a person's own social circle. In times of crisis, people's actions and messages can strongly influence the people they are close to (Wendell and Su, 2011; Tindall and Wellman, 2001). Lindell et al. (2015) found advisories from peers to be the most common influencing factor on evacuation decisions during a tsunami threat. Interpersonal networks help provide validation during decision-making processes for people living with disabilities (Spence et al., 2007). Social media has the potential to enhance or even create these networks, as

well as acting as digital “buddy systems” (Merchant, Elmer and Lurie, 2011). Via Facebook, these influences can include people posting messages on their profile walls explaining how they are preparing for something or are evacuating. It includes sharing of official information from public safety agencies they have connections to.

Fire departments can leverage these connections and spread information to those stakeholders with whom they have weaker relationships (Wendell and Su, 2011). Linking stakeholders together is critical for FEMA’s “Whole Community” approach. This concept views the public as a vital resource for information and awareness when dealing with hazards, and recognizes that it takes all aspects of a community to manage risk before, during, and after crisis events (FEMA, 2011; Fugate, 2011). This concept has embraced social media tools as essential for linking these various stakeholders together.

These links, as explained by Wagner and Majchrzak (2007), can facilitate collaboration and information exchange. These processes build trust, which help increase citizens’ feelings of connectedness within a community (Delli Carpini, 2004; Zhang et al., 2010). This connectedness can help increase social capital (Zhang et al., 2010).

Social capital consists of the resources people have access to via their social networks and connections (Ellison et al., 2014). These relationships can give people shared access to other desired physical, support, or knowledge based resources (Ellison et al., 2014; Zhang et al., 2010). Social capital leads to increased civic participation, including volunteering or working on community projects (Zhang et al., 2010).

Historically, community members found help during and after emergencies from one another before receiving it from any official response agencies (Quarantelli and Dynes, 1977; Shellong, 2008). While these actions largely still happen, changes in lifestyles have weakened many of these traditional community structures. People's lives are often rooted outside of the communities in which they live (Shellong, 2008; Tindall and Wellman, 2011). Communication and travel technologies make it easy for people to have close social circles that they are not in close geographical proximity to (Tindall and Wellman, 2011). These distant relationships weaken social capital.

Facebook's networking, information sharing, and social coordination abilities make it an ideal tool to use to increase social capital (Ellison et al, 2014; Caers et al, 2013; Zhang et al., 2010). Continued engagement and relationship maintenance strengthens connections (Ramanadhan et al., 2013; Ellison et al., 2014). Fire departments and other emergency services organization can help boost social capital by using social media to help keep people connected to community resources (Dufty, 2013; Hjorth and Kim, 2011; Keim and Noji, 2011).

Social media helps make information exchange more democratic (Shen and Bissell, 2013). Interactivity occurs not only between the agency and its followers, but also between stakeholders communicating among themselves on the agency page (De Vries, Gensler, and Leeflan, 2012). These interactions can help people solve one another's problems through collaboration without the need for official fire department interaction (Vivek, Beatty, and Morgan, 2012; Lovejoy and Saxton, 2012). They can help those affected by disasters to help manage their own recovery (Keim and Noji, 2011). This, in effect, can help act as a force multiplier (Wendell and Su, 2011).

2.3 Content

We have reviewed literature on various goals and tactics that fire departments can utilize for effective social media and Facebook usage. The next key analysis is that of content.

Unfortunately, with Facebook, content sharing is not always as straightforward as it seems. Much of this has to do with the secretive and ever changing nature of Facebook's proprietary content showing algorithms (van Dijck and Poell, 2013). Facebook continually tweaks its application based on user behavior and business model interests (van Dijck and Poell, 2013). These changes can create significant challenges for agencies such as fire departments, which often have limited experience, resources and staffing to keep up with and understand technology. This situation can create "buy-in" issues for emergency services agencies looking to adopt and improve the usage of Facebook and other social media tools (Wendell and Su, 2011).

Organizations can have significant numbers of pages followers, but there is no guarantee that everyone will see all posted content. Much of this has to do with these secret internal algorithms that decide what content will be most interesting, and therefore, most visible to users (Bucher, 2012; Taylor, 2011). Content that Facebook's internal processes consider to not be engaging will not even appear in the feeds of many for whom it was shared (Bucher, 2012). These algorithms, originally known as EdgeRank, and now referred to as News Feed Ranking, include as many as 100,000 individual factors that determine what appears in someone's Facebook newsfeed (McGee, 2013).

To help ensure that content appears in followers' newsfeeds, organizations need to post material that generates online user interactivity. Page administrators are able to

gauge the effectiveness of their posts by the responses they get from other users (Farquhar, 2012; Swani, Milne, and Brown, 2013). These responses can be in the form typed *comments* or by simple *likes* or *shares*. These various “one-click” buttons allow users to easily express their feelings toward viewed content (Parsons, 2013). Their speed and ease encourage frequent interaction (De Vries, Gensler, and Leeftan, 2012; Swani, Milne, and Brown, 2013). As of early 2016, Facebook also introduced “reactions,” which include several one-click emojis such as a heart for love and frowning face for sad (Stinson, 2016)¹. As they require more effort from the user, comments likely hold more weight when determining what is chosen as interesting content (Bucher, 2012; Taylor, 2011).

These interactions are seen not just by the two parties involved, but also in the news feeds of friends connected to the users who are doing the engaging (Swani, Milne, and Brown, 2013; Shen and Bissell, 2013). This visibility, essentially, allows engaged followers to act as endorsers and promoters of the content shared on your page (Swani, Milne, and Brown, 2013). This “viral” process helps interesting content spread very quickly (Shen and Bissell, 2013).

Facebook users are more likely to like or engage with posted material when they see one or more of their friends have also engaged with that same content (Swani, Milne, and Brown, 2013). This amplification is important for emergency messages. Research has shown that people tend to respond to warning messages more when they see others in their social circles responding to them as well (McLean and Power, 2013; Lindell and

¹ Data for this study was collected from posts made in December 2014. This was before the launch of “reaction” emojis and therefore they are not reflected in the study results.

Perry, 2012).

Posted content must actively attract and keep stakeholder's attention, as well as promote interactivity (Waters and Lo, 2012; Wendell and Su, 2011). Entertaining and current content leads to increased engagement (De Vries, Gensler, and Leeftink, 2012; Parsons, 2013). It increases follower satisfaction and loyalty (Gummerus et al., 2012).

Not only are social media tools competing with other forms of entertainment, they are competing with each other for people's attention. This competition both takes up people's available time, but also can turn them off due to an overload of information (Bright, Kleiser, and Grau, 2014). Although overall social media usage continues to expand, many long-time users have moved away from these tools. This exodus is often due to several reasons including information overload, privacy concerns, and boredom. Users, especially younger ones, do not find social media entertaining anymore (Bright, Kleiser, and Grau, 2014). This "social media fatigue" is leading to declines in active engagement on Facebook (Bright, Kleiser, and Grau, 2014, 148). A 2016 report claimed original content sharing on Facebook by non-professional sources was down as much as 21% (Griffith, 2016). In their study of Western European citizen's engagement with local governments' Facebook pages, Bonson, Royo, and Ratkai (2015) found the most common type of post contained links to other content. These posts, however, received the lowest levels of engagement from followers.

Even with challenges, the upside of fire departments utilizing Facebook for interaction with stakeholders remains high. Discovering what types of content are popular with followers is relatively easy. Page administrators can simply note what posts

get the most likes, shares, or comments (Bonson, Royo, and Ratkai, 2015; Gummerus et al., 2012). Although departments can learn from one another, since fire departments are usually local government organizations, it is important to find out what local stakeholders are interested in and find valuable (Kaplan and Haenlein, 2009).

Organizations should develop online personalities that make them seem authentic and responsive (Schultz and Peltier, 2013). Even if multiple people manage an account, it is important that interactions are consistent, clear, and personal (Wendell and Su, 2011). Questions or comments left on pages should get replies, even just a “thanks” works. This reinforces the idea of interactivity and leads to repeat views of the page by people going back to read responses (Waters et al., 2011).

Most research has focused on the use of social media during and after disasters (Sheil, Violanti, and Slusarski, 2011). Little exists on how response agencies can effectively utilize social media on a day-to-day basis. This paper examines what content fire departments typically post to Facebook, the world’s biggest social media site. It also looks at what content generates the most engagement with followers.

2.4 Research Questions

Facebook has become a significant, mainstream tool for people and organizations to share and consume content. This usage has extended to and repeatedly proven essential to public safety agencies and community stakeholders before, during, and after disasters and major crises. Less understood is how these agencies, and in particular local fire departments, can best utilize Facebook on a day-to-day basis.

Although research on fire service use of social media and Facebook is growing, no study has looked at what variables affect the amount of online interaction different posted content receives. Understanding this engagement, measured by the numbers of *likes*, *comments*, or *shares* posted content receives, is critical for fire departments to understand in order to most effectively reach their stakeholders.

Waters et al. (2009) found that nonprofit organizations use Facebook in three ways in order to cultivate relationships with their followers. The first of these strategies is disclosure. In response for demands for more transparency, these efforts tell the story about what the organization does, its history, and its people (Waters et al., 2009). The next strategy is usefulness. Usefulness focuses on information dissemination to followers (Waters et al., 2009). The final strategy is interactivity. This seeks to develop both online and offline interactive relationships with followers (Waters et al., 2009).

For this study, these three strategy categories are slightly modified to reflect the content commonly posted by fire departments. They include *disclosure*, *information*, and *involvement*. Within these main categories, more specific subcategories of content are also identified.

Disclosure posts talk about the fire department, its people, and its activities. Within *disclosure* content are posts that discuss *history*, *fire department life*, and *activity recaps*. *History* posts talk about the activities, people, and resources from a fire department's distant past. *Fire department life* posts talk about a department's everyday moments, and its current personnel and assets. *Activity recaps* highlight events things the department has recently participated in, including organized events, emergency responses, and training sessions.

Information posts share general content and tell stakeholders about news or hazards that could affect them or the community. *Information* posts include *general information*, *public service announcements*, and *situational awareness*. *General information* posts share non-emergency related local news and information. This can include non-fire department related community news, or posts about the fire service in general. *Public service announcements* include general safety awareness content. *Situational awareness* posts include locally specific “happening now” type safety information, including weather alerts and road closures.

Involvement posts seek direct interaction between the fire department and stakeholders. Subcategories contain *physical involvement*, *virtual involvement*, and *general engagement* content. *Physical involvement* content discusses initiatives the fire department is planning or engaged in that seek in-person public participation. These can be meetings, educational classes, or other events. *Virtual involvement* posts seek online interaction, such as surveys or trivia questions. *General engagement* includes light-hearted entertainment content such as the sharing of jokes or cute pictures, as well as community “thank you’s” or holiday greetings.

The research questions (RQs) explore what types of content among these main strategies and subcategories generate the most online interaction on official fire department Facebook pages. The numbers of *likes*, *comments*, and *shares* each post receives measures this interaction. Other variables examined include posts containing content *shared from another Facebook page*, having *links to other web pages*, the *day* and *time* the posts are initially made, and whether the posts contain *videos* or *images*.

- RQ1: Is there a difference among Facebook users' online interaction with fire departments' *disclosure*, *information*, and *involvement* posts?
- RQ2.1: Is there a difference among Facebook users' online interaction with fire departments' *disclosure* post subcategories (*history*, *fire department life*, *activity recaps*)?
- RQ2.2: Is there a difference among Facebook users' online interaction with fire departments' *information* post subcategories (*general information*, *public service announcements*, *situational awareness*)?
- RQ2.3: Is there a difference among Facebook users' online interaction with fire departments' *involvement* post subcategories (*physical involvement*, *virtual involvement*, *general engagement*)?
- RQ3.1: Is there a difference among Facebook users' online interaction with fire departments' posts based on whether they include *shares from other Facebook pages*?
- RQ3.2: Is there a difference among Facebook users' online interaction with fire departments' posts based on whether they include *links to other web pages*?
- RQ4.1: Is there a difference among Facebook users' online interaction with fire departments' posts based on the *day* they are made?
- RQ4.2: Is there a difference among Facebook users' online interaction with fire departments' posts based on the *time* they are made?
- RQ5.1: Is there a difference among Facebook users' online interaction with fire departments' posts that include *videos*?
- RQ5.2: Is there a difference among Facebook users' online interaction with fire departments' posts that contain *images*?

CHAPTER III

METHODOLOGY

3.1 Sampling

The study conducts an exploratory overview on the usage of Facebook by American fire departments. It examines the postings of fifty local fire departments and districts from throughout the United States during a one-month period in December 2014. It then codes those postings based on content and analyses the amount of engagement different posts receive based on several variables.

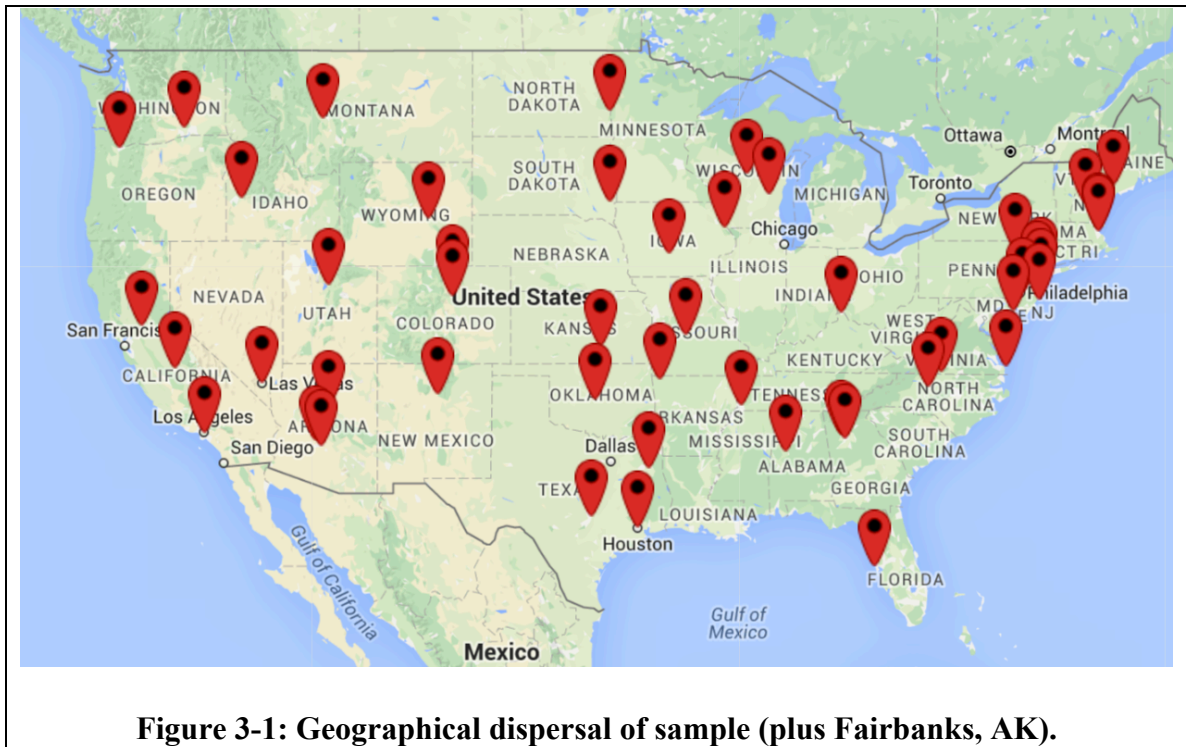
December marks the start of the peak residential fire time in the United States. Fires in the home, often caused by heating and cooking incidents, lead to the highest occurrences of fire related injuries and deaths (NFPA, Web). December also marks the onset of winter and unpredictable weather in many places. Information about impending storms, travel disruptions, road closures, and other real-time situational awareness was expected. It is also a busy time for local community events. Many fire departments are active during this time of year in things such as food and toy drives, holiday parades, and Santa Claus runs.

Homogeneous purposive sampling was used to choose the included agencies. This sampling method seeks out settings where specific processes are likely to occur (Denzin and Lincoln 1994; Silverman, 2013). It also seeks a homogeneous population that contains units sharing the same characteristics (www.dissertation.laerd.com, Web). To be included in the study, the researcher first identified fire departments having official and active Facebook pages. It is not uncommon for fire departments, especially those in large cities, to have unofficial pages run by “fans” of the agency or other members of the community. The departments chosen for study have Facebook pages managed by employees or volunteers from within their organization. It is also not uncommon for departments to have official pages set up, but populated with little to no content. Any department found with a page that was active but not populated with content was eliminated from inclusion in the study.

Several of the agencies chosen were already familiar to and followed by the researcher via his personal Facebook account. From there, geographic and community size dispersion was considered when locating other agencies with suitable pages for study. Various “safest city” indexes, including those from Fortune Magazine and Safewise.com, were referenced on the assumption that “safer” places might have more engaged fire department, with mixed results. Neighboring cities to these places were often found to have, however, to have Facebook pages that fit the criteria for sample inclusion.

Included agencies come from thirty-five states and stretch from east to west and north to south (Figure 3-1). The largest department examined is the Fire Department of the City of New York (FDNY), protecting a population of over 8 million in New York,

NY. The smallest is the Sunrise Beach Fire Protection District in Sunrise Beach, MO, which serves a year-round population of fewer than 500 (Figure A-1). Their numbers of followers range from over 300,000 (FDNY) to just under 600 (Elk Lake, PA) (Figure A-2).



3.2 Coding

Each post made during the month examined was recorded and manually coded for content. The numbers of *likes*, *comments*, and *shares* for each post are the dependent variables. The independent variables include the main content strategies of *disclosure*, *information*, and *involvement*. They also include each main content category's subcategories. For *disclosure*, these include *history*, *fire department life*, and *activity recaps*. *Information* includes *general information*, *public service announcements*, and

situational awareness. Physical involvement, virtual involvement, and general engagement make up the *involvement* subcategories. Other independent variables examined include *shares from other Facebook pages, links to other web pages, day and time* of original post, and whether the post contains *video* or *images*.

Content analysis requires researchers to recognize, interpret and quantitatively categorize messages (Ramanadhan et al., 2013). It is defined by Berelson (1952, 18) as “a research technique for the objective, systematic, and quantitative description of the manifest content of communication.” These processes must be duplicable and accessible to others (Krippendorff, 2013). Facebook pages are especially suited for this as their metrics, including the numbers of likes, comments, and shares, are publically viewable and constantly current (Lai and To, 2015). Anyone with Facebook access can access these pages and see what is posted and how much engagement these posts receive (Bonson and Ratkai, 2013).

Initial exploratory coding was conducted on the reviewed content. Three main content categories with three sub categories each are then organized. As discussed, the three main categories are *disclosure, information, and involvement*. The Waters et al. (2009) work on how non-profit organizations use Facebook is the basis for these main categories. These are also similar to Mergel’s (2014) three strategies of transparency, participation, and collaboration.

Disclosure posts talk about the fire department. They discuss the agency’s history and people. They highlight every day moments and life in the community and fire stations. They release news and information relating specifically to the fire

department or its members. They talk about department assets such as vehicles, equipment, and buildings. They also recap things the department has participated in, such as organized events, emergency responses, and training initiatives. For the study, these subcategories are organized as *history*, *fire department life*, and *activity recaps*.

Information posts share general content and tell stakeholders about news or hazards that could affect them or the community. These posts discuss things that may be “happening now.” They give specific situational awareness information such as road closures, flooding or smoke conditions. They discuss events that may be happening in the near future, such as weather forecasts. They share general hazard safety public service announcements and release product recalls. Topics discussing other places, non-fire department related community news, or the fire service in general, are also included here. Subcategories for these topics are *general information*, *public service announcements*, and *situational awareness*.

Involvement posts include direct interactions between the fire department and stakeholders. They give announcements about upcoming events. They highlight initiatives the fire department is planning or engaged in that seek public participation. They ask for the public’s direct input on things. They share thank you messages or holiday greetings. They involve contests or trivia or simply the sharing of jokes or cute pictures. Subcategories for this content are *physical involvement*, *virtual involvement*, and *general engagement*.

Additional variables include whether a post is *shared from another Facebook page* or contains a *link to* a different web page. These are coded by simply noting

whether a share or link exists or not. *Day* and *time* of initial post is also coded. Six, four-hour blocks of time are organized. These are 6am-10m, 10am-2pm, 2p-6pm, 6pm-10pm, 10pm-2am, and 2am-6am.

Posts are coded whether they include *videos* or *images*. *Videos* can include ones uploaded directly within the post or accessed via a link to YouTube or another website. *Images* include any picture other than the thumbnail to a video. This picture can include a photograph directly uploaded into the post, or an image from a share from or link to other content.

The researcher completed initial coding. The researcher is a 19-year veteran firefighter who is also an experienced administrator of a fire department Facebook page. As the coding process remained somewhat subjective, three additional reviewers also coded a sample of the content population to determine inter-coder reliability or agreement. One reviewer has a background in research while the other two have backgrounds in the fire service. All three have bachelor's degrees.

Training on the coding categories occurred over two sessions using a provided coding guide (Figure A-3). Lombard et al. (2002, 589) define this process as “the extent to which independent coders evaluate a characteristic of a message or artifact and reach the same conclusion.” Although inter-coder agreement does not ensure validity, if it is not established, content analysis research can never be considered valid (Lombard et al., 2002). This process is recommended to demonstrate that different validators, when following the same content analysis procedure, reach and agree upon the same measurements and results.

Twenty percent of posts (227 of 1142) were randomly selected for review using an online list randomizer (www.random.org/lists). This is consistent with Kaid and Wadsworth's (1989) suggestion of a 10-25% sub-sample reviewed by trained and independent coders (Lacy and Riffe, 1996). Reviewers coded the posts across both the three main categories, as well as their subcategories. Among the twenty percent random sample, the average pairwise percent agreement was 93.54%. The Krippendorff Alpha (nominal) score was .899. This high rate of reliability (via <http://dfreelon.org/recal/recal3.php>) confirms the clarity and meaning of the categories (Table B-1).

3.3 Analytical Methods

Analysis of variance (ANOVA) and t-test are used to test the research questions (RQs). ANOVA is appropriate to test differences between the means of an interval-ratio-level dependent variable across independent variables that have three or more categories (Healy, 2012). ANOVA tests the effect of a single variable on others. With ANOVA, researchers look to see if data rejects the null hypothesis. The null hypothesis assumes the difference between the means of each data category is roughly the same. For the null hypothesis to be rejected, the variance between the means must be statistically significant.

ANOVA has limitations. It requires roughly equal numbers of cases in each category of the independent variable and the homogeneity of variance (Healy, 2012). For this study, this was not possible due to the numbers of Facebook posts for each content category type being unequal.

For tests that showed significance within ANOVA, additional tests were conducted using the Levenes' homogeneity test and Welch and Brown-Forsythe robust tests of equality of means. While ANOVA can tolerate some deviance, these tests are more suitable when dealing with unequal variances and sample sizes. Also, if the null hypothesis is rejected, ANOVA is not specific in indicating what is significant in causing this rejection. It merely indicates that one category's mean is statistically significantly different from the others (Healy, 2012).

T-tests were used to test variables containing only two groups. These tests compare whether two independent variables have statistically significant different means that are unlikely to have occurred randomly. T-tests are limited, however, to looking only at means and individual scores (Healey, 2012).

CHAPTER IV

RESULTS

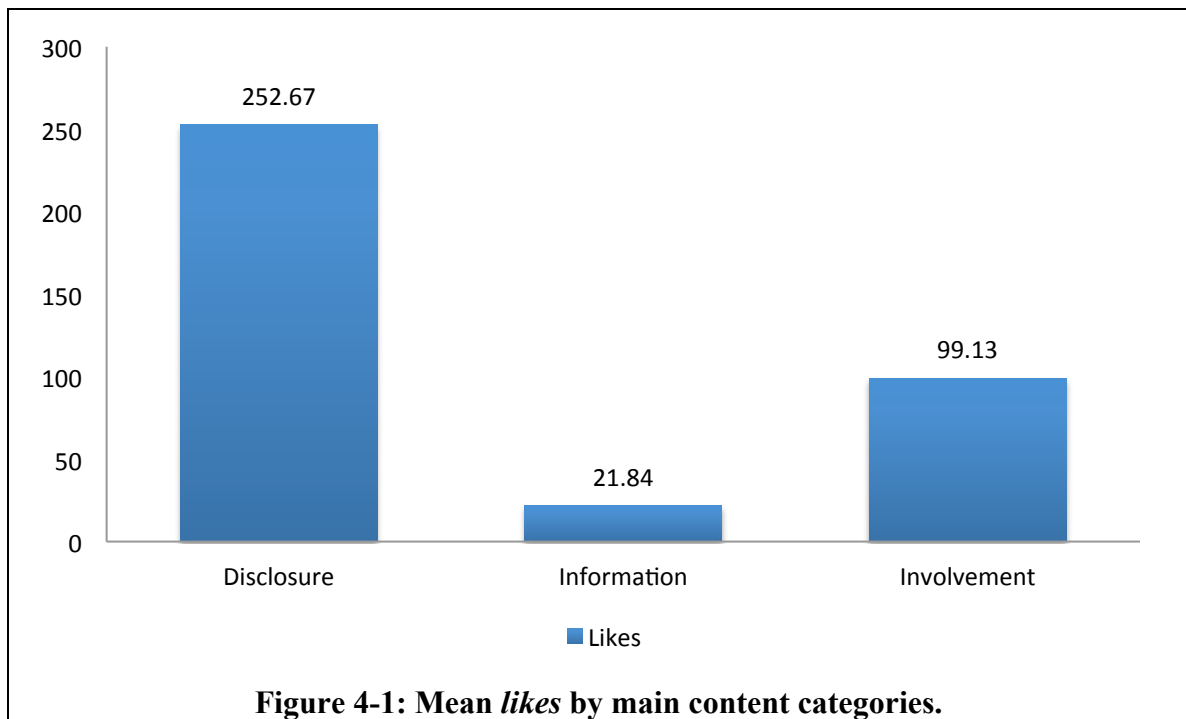
Nearly all posts in the sample, 97.37% (n=1112) received at least one *like*, *comment*, or *share*. The descriptive statistics shows that *likes* were the most common types of engagement with 97.19% (n=1110) of posts receiving at least one. *Shares* were the second most common type of interaction, with at least one found in 48.51% (n=554) of posts. *Comments* were the least common engagement type, with at least one found in 46.32% (n=529) of content. The following paragraphs show the results of the statistical analysis on each research question.

The RQ1 (*Is there a difference among Facebook users' online engagement with fire departments' disclosure, information, and involvement posts?*) was partially supported. Three separate ANOVA analyses were conducted on the mean differences between the numbers of *likes*, *comments*, and *shares* for each of the main content categories of *disclosure*, *information*, and *involvement*.

Across all posts, the mean *likes* were 136.59 (n=1142). The ANOVA analyses show a significant difference in the mean amounts of *likes* ($F_{2,1139} = 9.45, p < .01$)²

² Because the AVOVA results showed that the standard deviation of the *disclosure* category was much larger than others, a Levene's Test of Homogeneity was performed. The result was significant ($F_{2,1139}=22.28, p<.01$). This result indicated that the ANOVA assumption of equal variance was not met. In order to overcome this violation, the Welch and Brown-Forsyth test were used. The adjusted F-ratio indicated that the results were significant (Welch test: $F_{2,449}=15.49, p < .01$ and Brown-Forsyth test:

between the three main content categories of *disclosure*, *information* and *involvement*. *Disclosure* content (n=483) saw the most *likes* with a mean of 252.67. *Involvement* posts (n=253) were next, with an average of 99.13 *likes*. *Information* posts (n=406) received the fewest *likes*, averaging 21.84 (Figure 4-1).

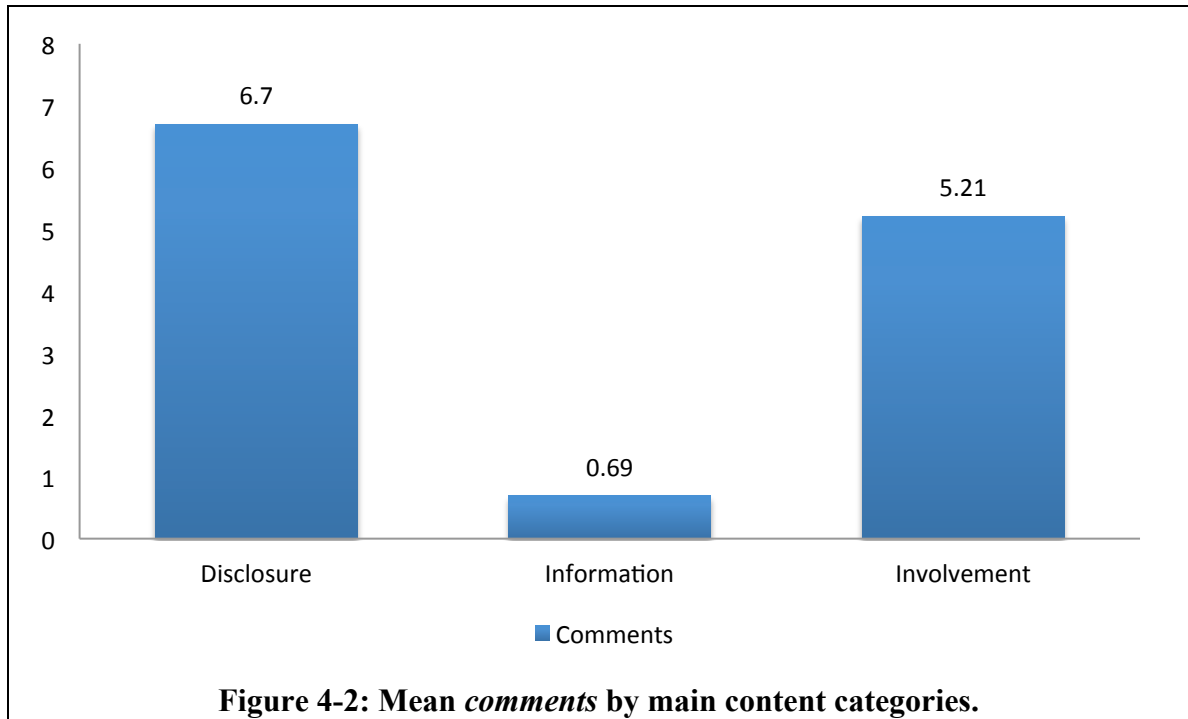


Via one-way ANOVA, the mean number of *comments* between the three main content categories was found to be statistically significant ($F_{2,1139} = 11.34, p < .01$)³. Each post saw an average of 4.23 (n=1142) *comments* per post. *Disclosure* content (n=483) saw the most *comments* with a mean of 6.70. *Involvement* posts (n=253) were next, averaging 5.21. *Information* (n=406) received the fewest with a mean of .69 (Figure 4-2).

$F_{2,575}=13.09, p < .01$). The same statistical testing process will be performed for the rest of the RQs if the ANOVA results show much larger SD in one group but not the other groups.

³ Levene's Test of Homogeneity: $F_{2,1139}=23.54, p<.01$; Welch test: $F_{2,449}=19.75, p<.01$; Brown-Forsyth test: $F_{2,604}=10.87, p<.01$.

There was no significant statistical difference via one-way ANOVA, however, in the mean number of *shares* among the three main content categories ($F_{2, 1139} = .15, ns$). These differences were considered random.

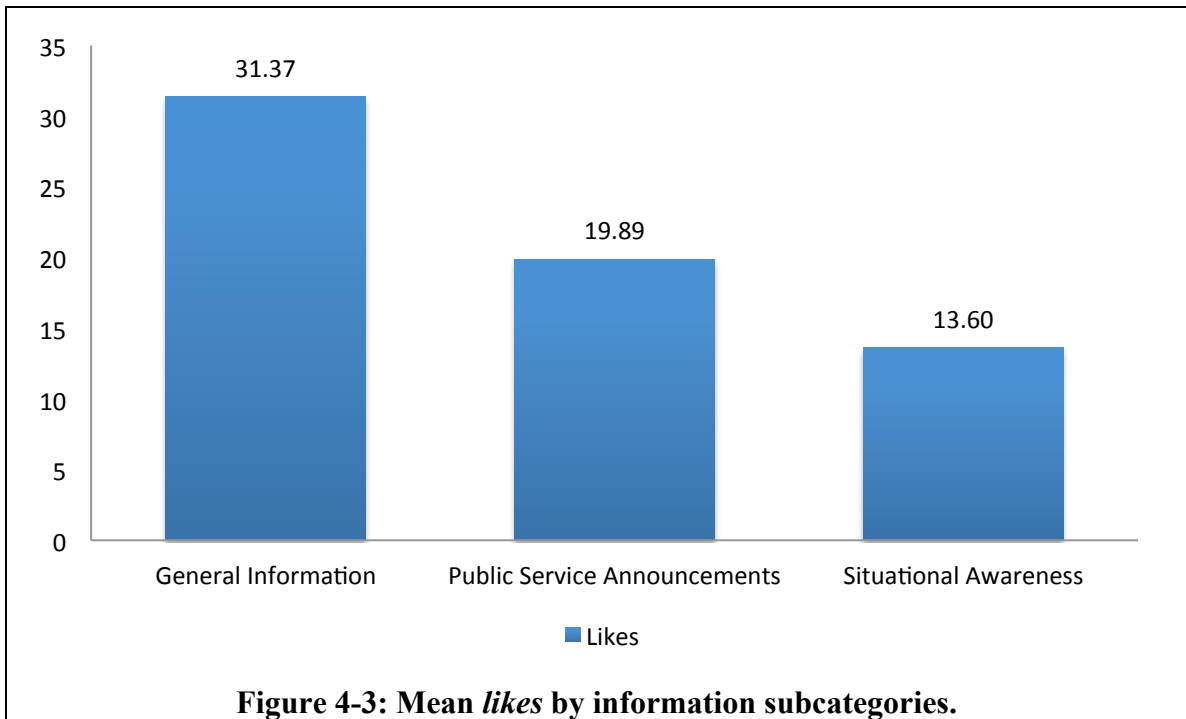


The RQ2.1 (*Is there a difference among Facebook users' online engagement with fire departments' disclosure post subcategories?*) was not supported. The statistical analyses results, via one-way ANOVA, do not show a significant difference in the mean numbers of *likes* ($F_{2,480} = .070, p= ns$), *comments* ($F_{2,480}=.308, p= ns$), or *shares* ($F_{2,480}=.156, p= ns$) among the disclosure content subcategories of *history*, *fire department life*, or *activity recaps*.

The RQ2.2 (*Is there a difference among Facebook users' online engagement with fire departments' information post subcategories?*) was partially supported. The analyses showed that there are significant differences among the *likes* for fire departments'

information post subcategories ($F_{2,403} = 4.11, p < .05$)⁴ (Figure 4-3). In the descriptive statistics across the three subcategories of this content, the overall mean number of *likes* was 21.84.

General information posts received the most *likes* with 31.37. *Public service announcements* followed with 19.89. *Situational awareness* content saw the fewest number of *likes* with a mean of 13.60. The differences, via one-way ANOVA, between the mean number of *comments* ($F_{2,403} = 2.975, p = ns$) and *shares* ($F_{2,403} = .521, p = ns$) of the information subcategories were not statistically significant.

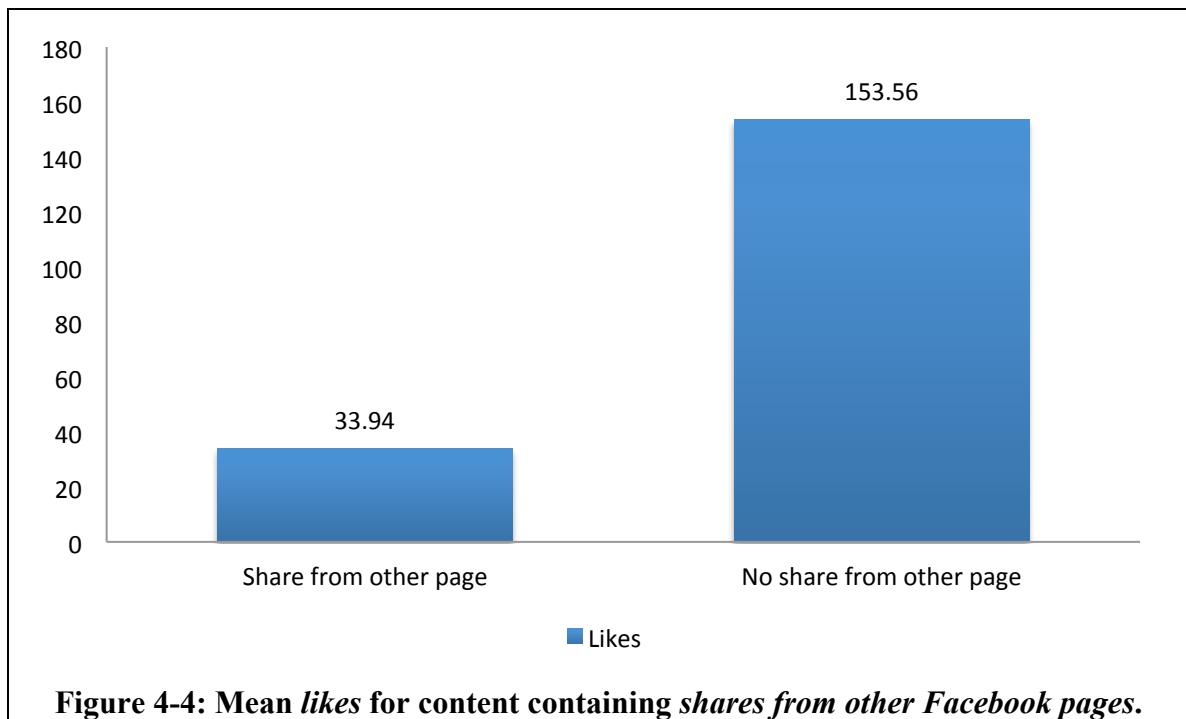


The RQ2.3 (*Is there a difference among Facebook users' online engagement with fire departments' involvement post subcategories?*) was not supported. The statistical differences between the mean number of *likes* ($F_{2,250} = .657, p = ns$) and *shares*

⁴ Levene's Test of Homogeneity: $F_{2,403} = 7.31, p < .05$; Welch test: $F_{2,209} = 4.05, p < .05$; Brown-Forsyth test: $F_{2,180} = 3.83, p < .05$.

($F_{2,250}=.657, p= ns$) were not significant via one-way ANOVA. The mean number of *comments* was not statistically significant based on the findings of the more robust Welch ($F_{2,51}=1.099, p= ns$) and Brown-Forsyth ($F_{2,22}=1.940, p= ns$) tests of equality of means⁵.

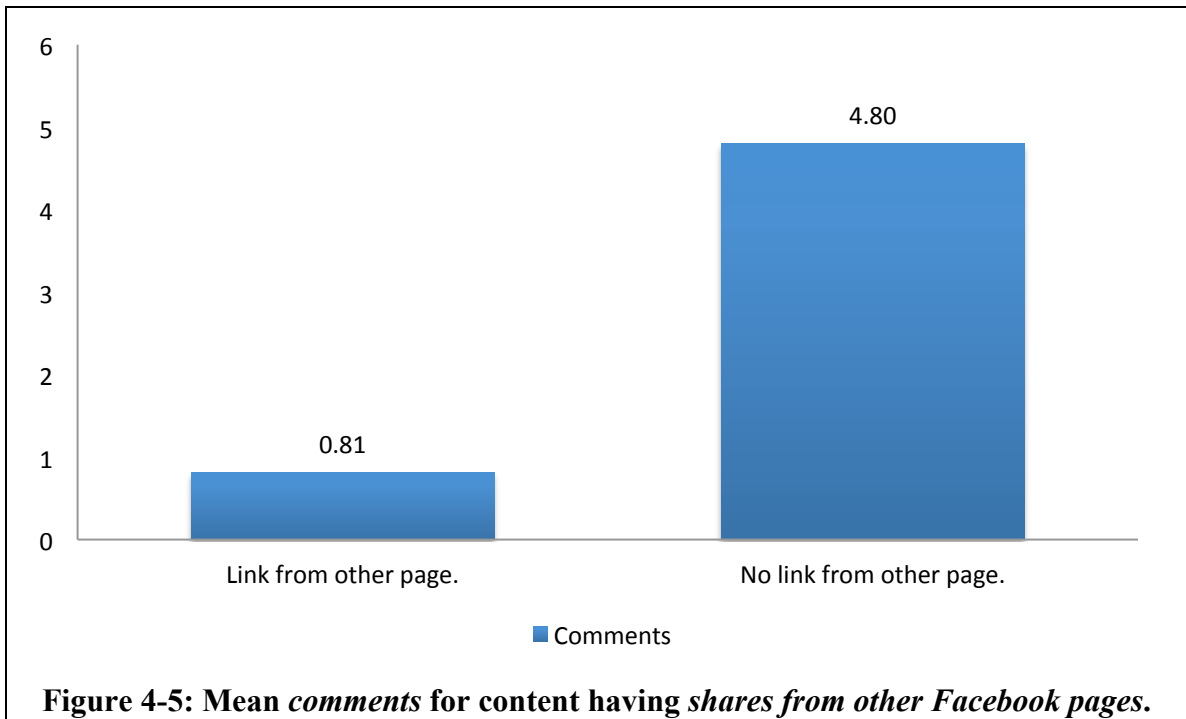
The RQ3.1 (*Is there a difference among Facebook users' online engagement with fire departments' posts based on whether they include shares from other Facebook pages?*) was partially supported. The descriptive statistics showed an average of 33.94 *likes* for posts containing content *shared from other Facebook pages* and 153.56 *likes* for posts that do not (Figure 4-4). The t-test showed a significant difference between the means of these posts ($t_{(1140)} = 4.26, p < .01$).



The descriptive statistics show a mean of .81 *comments* for posts containing content *shared from other Facebook pages* and a mean of 4.80 for pages that do not

⁵ Levene's Test of Homogeneity: ($F_{2,250}=32.465, p<.05$); Welch test: $F_{2,51}=1.099, p= ns$; Brown-Forsyth test: $F_{2,22}=1.940, p= ns$.

(Figure 4-5). The t-test showed these to have a significant difference ($t_{(1140)} = 5.90, p < .01$). The differences, via t-test, between the mean *shares* for content *shared from other Facebook pages* and those not containing *shares from other pages* were not significant ($t_{(1140)} = 1.06, p = ns$).

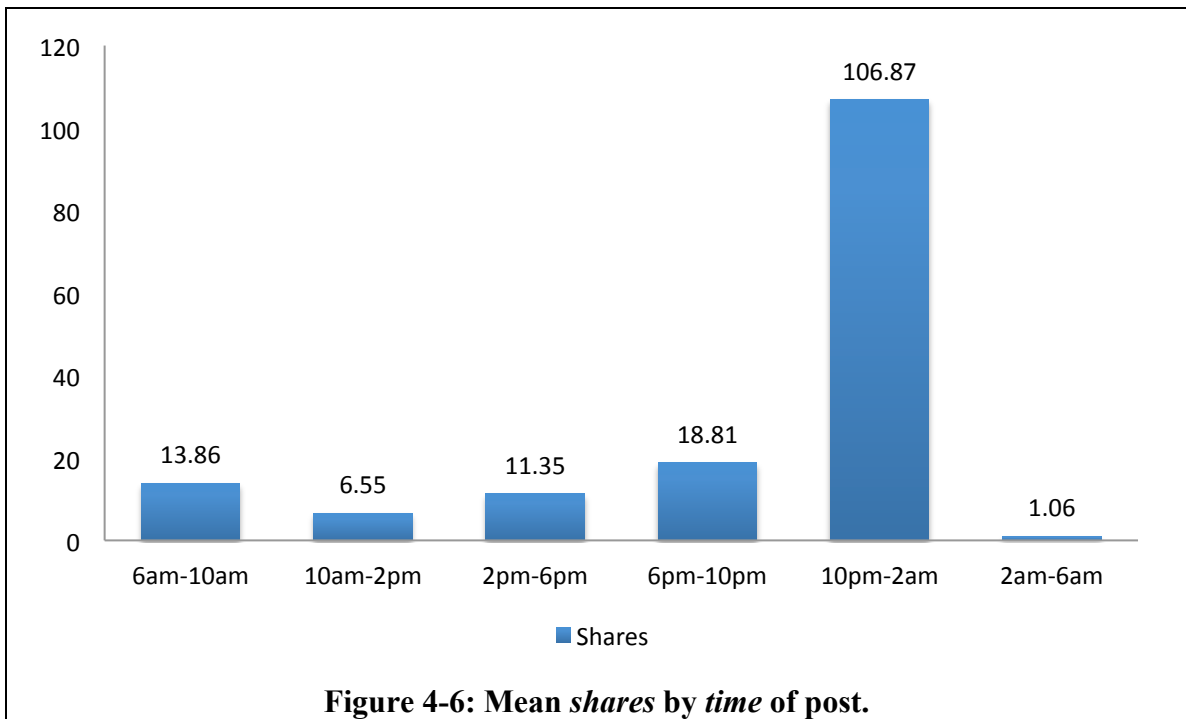


The RQ3.2 (*Is there a difference among Facebook users' online engagement with fire departments' posts based on whether they include links to other web pages?*) was not supported. The t-test showed that there is no significant difference between the mean *likes* ($t_{(1140)} = -.33, p = ns$), *comments* ($t_{(1140)} = .60, p = ns$), or *shares* ($t_{(1140)} = .42, p = ns$) for posts *including links to other web pages* versus posts not including links.

The RQ4.1 (*Is there a difference among Facebook users' online engagement with fire departments' posts based on the day they are made?*) was not supported. The statistical analyses results, via one-way ANOVA, do not show significant differences in

the mean amounts of *likes* ($F_{6,1135} = .457, p= ns$), *comments* ($F_{6,1135} = .779, p= ns$), or *shares* ($F_{6,1135} = .834, p= ns$) among the main content categories based on the *day* of the week they were posted.

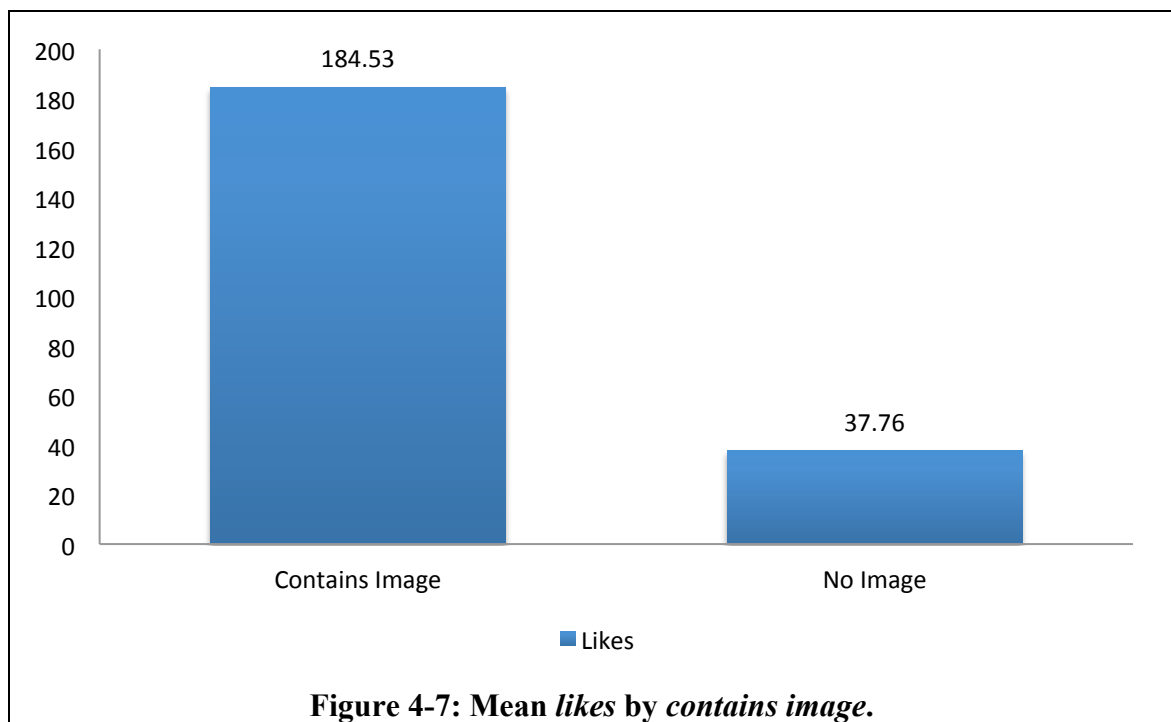
The RQ4.2 (*Is there a difference among Facebook users' online engagement with fire departments' posts based on the time they are made?*) was partially supported. The analyses, via one-way ANOVA, showed that there are significant differences in the mean number of *shares* of main category posts based on the *time* they were posted ($F_{5,1136} = 2.572, p < .05$)⁶. Posts made between *10pm-2am* ($n=67$) showed the highest mean number of *shares* with 106.87 (Figure 4-6). The statistical differences, via one-way ANOVA, in the mean amounts of *likes* ($F_{5,1136} = .707, p= ns$) or *comments* ($F_{5,1136} = .345, p= ns$) based on the time of posting were not significant.



⁶ Levene's Test of Homogeneity: $F_{5,1136}=10.143, p<.01$; Welch test: $F_{5,368}=34.814, p<.01$.

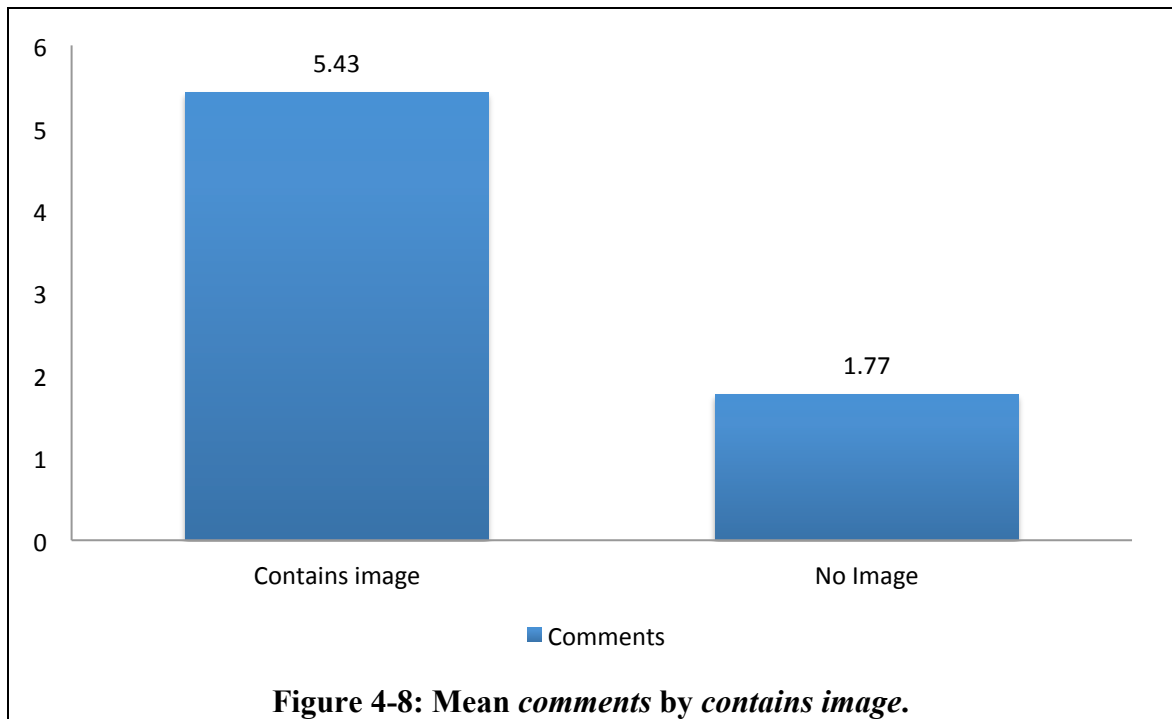
The RQ5.1 (*Is there a difference among Facebook users' online engagement with fire departments' posts that include videos?*) was not supported. The differences, via t-test, between the mean *likes* ($t_{(1140)} = 1.16, p = ns$), *comments* ($t_{(1140)} = 1.08, p = ns$), and *shares* ($t_{(1140)} = -1.03, p = ns$) among the main categories of content based on whether they *included videos* or did not was not significant.

The RQ5.2 (*Is there a difference among Facebook users' online engagement with fire departments' Facebook posts that contain images?*) was partially supported. The t-test showed a significant difference between the *likes* for posts *containing images* and the *likes* for posts not containing images ($t_{(1140)} = -4.09, p < .01$). The mean number of *likes* for posts containing images was 184.53 and 37.76 for posts not containing images (Figure 4-7).



The descriptive statistics show an average of 5.43 *comments* per post *containing*

an image against 1.77 for those not having an image (Figure 4-8). These results, via t-test, show significance ($t_{(1140)} = -4.16, p < .01$). The difference between the mean *shares* of posts *containing an image* and those not containing an image was not statistically significant ($t_{(1140)} = .78, p = ns$).



CHAPTER V

DISCUSSION & CONCLUSION

5.1 Discussion

Although people spend a lot of time on Facebook, it is a platform more often than not, for people to have quick, frequent entertainment experiences with (Bonson, Royo, and Ratkai, 2014; Murphy, 2013). The descriptive statistics support this concept; showing *likes* to be the most common type of Facebook engagement, followed by *shares*. The ease of simply “one-clicking” the *like* or *share* button is much easier than having to type a *comment* (Vries, Gensler, and Leeflan, 2012; Swani, Milne, and Brown, 2013). However, this study was not able to identify any statistically significant difference between the numbers of *shares* based on the content of posts.

The fire service is largely a local, government resource. Fire department activities typically happen in or near the communities they serve. Their people are a part of that community while on duty and often off. Their histories connect locally. Therefore, as the results of RQ1 indicate, it is not surprising that *disclosure* content gets the most engagement. It is consistent with Mergel’s (2013; 2014) findings that increasing transparency is the most common tactic for government agency social media use.

As discussed by Murphy (2013, 175), Facebook is increasingly a “communication channel.” Much like a traditional broadcasting network, attracting followers and getting

them to interact requires interesting and entertaining content (Waters et al., 2011). These requirements are consistent with *involvement* posts being the next most popular category, as found in RQ1. The goals of many posts described as *general engagement* or *virtual involvement* are to amuse followers and solicit online interaction. These goals are consistent with Mergel's (2013; 2014) findings of participation being another common government agency social media tactic.

This entertainment element makes the fact that *information* posts, largely consisting of safety *public service announcements*, were generally the least engaged type of content as found by RQ1, not surprising. If Facebook were a "channel" as Murphy (2013) describes, then *information* content would be the commercial breaks. Again, followers are looking to be entertained. These posts largely seek to educate. While obviously important, these types of posts are inconsistent with what people are generally going to Facebook for on a day-to-day basis.

Facebook is also growing as a place for people to get local news (Gottfried and Shearer, 2016). The results of RQ2.2 support this statement, showing a significant number of *likes* for posts containing *general information*. This is information about general things going on in a community. Fire departments posting information, including photos and videos, serve as local news broadcast sources. As discussed by Bonson, Royo, and Ratkai (2015), information about local issues resonate most with stakeholders. Lin et al. (2013), found information from local news sources were relied on more for evacuation information than national media. The dispersion of this type of content, as discussed by Bonson, Royo, and Ratkai (2015), helps agencies increase their social legitimacy.

These results set up a significant challenge for fire departments. While the emergence of social media and the near universal usage of Facebook offers these agencies an unprecedented to engage their stakeholders, the type of content that is most popular with followers is not the type traditional command and control agencies are used to sharing. As discussed by Ramanadhan et al. (2013), participatory approaches are uncommon among community based organizations. This situation, as discussed by Wallace (2006), contributes to a disconnect where the public does not know what their fire departments typically do and fire departments not knowing what their stakeholders want and expect. Also challenging, as found by RQ 2.2, is that posts containing *public service announcements* and *situational awareness* content are the least likely types to be engaged with by followers. As discussed by Lindell and Perry's (2012) PADM, this is the type content needed to be delivered and understood the most when trying to positively influence stakeholders' risk management behavior.

Posts *shared from* other Facebook pages or containing *links to* other web pages generally did not attract much engagement. This was consistent with the findings of Bonson, Royo, and Ratkai (2015). Schultz and Peltier (2013) discuss the importance of organizations developing their own authentic online personalities. Followers may perceive posts involving this content as being boring or lazy. Also, as they are not original, these posts are also likely to have been seen elsewhere in followers' Facebook feeds. This will decrease the likelihood of interaction.

As discussed in RQ4.2, posts made at different *times* did not show significance except for *shares*. The results indicate that Facebook users are more likely to share fire departments' posts in the *10pm-2am* periods than other times of day. Internal Facebook

mechanisms often determine the time and day when followers see content. These mechanisms remain proprietary and appear to be tweaked often. Although some followers see content immediately after it is posted, others may not see it for several hours or even the following day.

The results of RQ5.2 show posts containing images generally generated significantly more engagement than posts not having them. This result is consistent with the Boson, Royo, and Ratkai (2015) findings showing that posts with pictures lead to the highest level of social media engagement. These findings are also similar to the result of the Wu et al. (2015) study that concluded that experiment participants prefer graphic information to text and numeric content during hurricane threats. These results may have to do with the speed and simplicity of seeing a picture, as opposed to reading a text or watching a video. Pictures attract attention and can provide quick entertainment or informational value.

On the other hand, the results of RQ 5.1 showed that *video* did not have a significant impact on engagement. This is also consistent with the Boson, Royo, and Ratkai (2015) findings that text only posts received more engagement than those with video. People tend to rapidly scroll through their newsfeeds and videos require users to stop and watch. This is likely to change, however, as Facebook continues to increase the use of auto-play for *videos*. At the time of this study, not all *videos* posted were auto-play. They required a user to stop and press play. This is no longer the case, as of early 2015 (Blattberg, 2015).

5.2 Conclusion

This study examines the amount of engagement that different types of fire service Facebook posts receive. It breaks down and categorizes this posted content and tests several variables to see what gets the most *likes*, *comments*, and *shares* from followers (Table 5-1). These findings can help local fire departments and public information officers better understand how to effectively interact with their Facebook followers on a day-to-day basis.

VARIABLE	LIKES	COMMENTS	SHARES
Main Content Categories			
• Disclosure	252.67	6.7	-
• Information	21.84	.69	-
• Involvement	99.13	5.21	-
Information subcategories			
• General information	31.37	-	-
• Public Service Announcements	19.89	-	-
• Situational Awareness	13.60	-	-
Includes share from other page	33.94	.81	-
No share from other page	153.56	4.80	-
Time of post			
• 6am-10am	-	-	13.86
• 10am-2pm	-	-	6.55
• 2pm-6pm	-	-	11.35
• 6pm-10pm	-	-	18.81
• 10pm-2am	-	-	106.87
• 2am-6am	-	-	1.06
Includes image	184.53	5.43	-
No image	37.76	1.77	-

Table 5-1: Summary of significant results.

Likes were the most common types of engagement, with nearly every post in the study receiving at least one. The difference in the mean numbers of *likes* among the main content categories was statistically significant. *Comments* were the least frequent

follower action, with less than half of posts receiving one or more. The difference in the mean number of *comments* across the main content categories was also statistically significant. *Shares* were the second most common type of interaction, with just about half of all posts getting at least one. The difference, however, in the mean numbers of *shares* among the main content categories was not statistically significant.

Disclosure content generally brought the most engagement from followers. These posts saw statistically significant differences between the number of *likes* and *comments* compared to the other main content categories. Among *disclosure* subcategories, there was not a significant statistical difference in the mean numbers of *likes*, *comments*, or *shares*, among *history*, *fire department life*, or *activity recap* posts.

Involvement posts were generally the second most engaged content type. They received the second most *likes* and *comments*. Among the *involvement* subcategories of *physical involvement*, *virtual involvement*, and *general engagement*, there was no significant statistical difference in the number of *likes*, *comments*, or *shares*.

The content category generally receiving the least amount of engagement was *information*. These posts received the fewest average number of *likes* and *comments*. Within the *information* subcategories of *general information*, *public service announcements*, and *situational awareness*, there was a significant statistical difference in the number of *likes* between the categories, but not *comments* or *shares*.

Posts *shared from other Facebook pages* or containing *links to other web pages*, generally did not receive as much engagement as posts not containing this type of

content. Neither type of content received significant numbers of *likes*, *comments*, or *shares*.

The *day* of the week content was posted generally did not show statistical significance. The *time* content was initially posted did not lead to a significant number of *likes* or *comments*. However, posts made late at night, from *10pm-2am*, did show a statistically significant number of *shares*.

Content containing *videos* did not lead to a statistically significant difference in the mean numbers of *likes*, *comments*, or *shares*. Posts containing *images* did show a significant statistical difference in the mean numbers of *likes* and *comments* compared to posts *not having images*. They did not, however, show a significant number of *shares*.

This study has several limitations. First, it contains a relatively small sample size. Of the more than 27,000 fire departments in the United States, only fifty are examined. Although these departments cover varying places across the country, different local stakeholders may have different needs. A volunteer fire department is able to talk about a much more local area than a large city fire department covering neighborhoods many miles apart. Also, only one month's worth of postings are included.

The ever-changing nature of Facebook also makes studying its usage very challenging. The internal rules and mechanisms of Facebook are largely secretive and often change with little notice. As Ellison and Hardy (2015) discuss, Facebook's primary corporate interest is a commercial one, and not a social or community one.

The study is useful, however, to get a basic understanding of how fire departments are using Facebook and what posted content leads to the most engagement

with followers. Facebook has essentially become a mainstream, broadcasting tool. For the first time, fire departments and other emergency services organizations have direct access to and a significant amount of influence over what content is delivered to their stakeholders. It is likely that these findings can be applied to other social media tools, as well. Different social media applications are likely to reach different audiences. It is essential for fire departments to understand these additional social media tools and use them, along with other traditional outreach efforts, to engage the widest range of stakeholders possible. Risk prevention, mitigation, and preparedness are among the fire service's most important goals. Improved engagement with the public on a day-to-day basis can improve the success of these endeavors and lead to increased safety for both stakeholders and emergency responders alike.

Future recommended research would include expanding on the numbers of cities examined, as well as having increasing the period of study. Video is also likely to increase as an element of content. Different variables related to these videos could be studied. As discussed, various stakeholder demographics use different social media applications. Additional research could be used to see how engagement can be maximized on platforms such as Twitter, Instagram, Snapchat, or whatever other future applications are introduced.

REFERENCES

- Berelson, B. (1952). *Content analysis in communication research*. Glencoe, IL: Free Press.
- Bird, D., M. Ling, and K. Haynes (2012). Flooding Facebook – the use of social media during the Queensland and Victorian floods. *The Australian Journal of Emergency Management*, 27(1), 27-33.
- Blattberg, Eric (2015). Like it or not, autoplay video won. Web. Retrieved May 24, 2016. From <http://digiday.com/publishers/autoplay-video-beat-regular-video-sorry-guys/>.
- Bonson, E. and M. Ratkai (2013). A set of metrics to assess stakeholder engagement and social legitimacy on a corporate Facebook page. *Online Information Review*, 37(5), 787-803.
- Bonson, E., S. Royo, and M. Ratkai (2015). Citizens' engagement on local governments' Facebook sites. An empirical analysis: The impact of different media and content types in Western Europe. *Government Information Quarterly*, 32(2015), 52-62.
- Bordua, D. J. and L. L. Tifft (1971). Citizen interviews, organizational feedback, and police-community relations decisions. *Law & Society Review*, 6(2), Special Police Issue, 155-182.
- Bright, L. F., S. Bardi Kleiser, and S. Landreth Grau (2014). Too much Facebook? An exploratory examination of social media fatigue. *Computers in Human Behavior*, 44(2015), 148-155.
- Bucher, T. (2012). Want to be on the top? Algorithmic power and the threat of invisibility on Facebook. *New Media & Society*, 14(7), 1164-1180.
- Cacciatore, J., B. Carlson, E. Michaelis, B. Klimek, and S. Steffan (2011). Crisis intervention by social workers in fire departments: An innovative role for social workers. *Social Work*, 56(1), 81-88.

- Caers, R., T. De Feyter, M. De Couck, T. Stough, C. Vigna, and C. Du Bois (2013). Facebook: A literature review. *New Media & Society*, 15(16), 982-1002.
- Clary, B. B. (1985). The evolution and structure of natural hazard policies. *Public Administration Review, Special Issue* (1985), 20-28.
- Coleman, R. J. and J. A. Granito (1988). *Managing fire services*. Washington, DC: International City Management Association.
- Dabner, N. (2012). 'Breaking ground' in the use of social media: A case study of a university earthquake response to inform educational design with Facebook. *Internet and Higher Education*, 15(2012), 69-78.
- Delli Carpini, M. X. (2004). Mediating democratic engagement: The impact of communications on citizens' involvement in political and civic life. In L. L. Kaid (Ed.), *Handbook of Political Communication Research*, L. L. Kaid (Ed.). Mahwah, NJ: Lawrence Erlbaum Associates, 395-434.
- De Vries, L., S. Gensler, and P. S.H. Leeflang (2012). Popularity of brand posts on brand fan pages: An investigation of the effects of social media marketing. *Journal of Interactive Marketing*, 26(2012), 83-91.
- Duffy, N. (2012). Using social media to build community disaster resilience. *The Australian Journal of Emergency Management*, 27(1), 40-45.
- Duggan, M., N. B. Ellison, C. Lampe, A. Lenhart and M. Madden (2015). Social media update 2014: Demographics of key social networking platforms. Pew Research Center. Web. Retrieved February 19, 2016. From <http://www.pewinternet.org/2015/01/09/demographics-of-key-social-networking-platforms-2/>.
- Eisenman, D. P., K. M. Cordasco, S. Asch, J. F. Golden, and D. Gilk (2007). Disaster planning and risk communication with vulnerable communities: Lessons from Hurricane Katrina. *American Journal of Public Health* 97(S1), S109-S115.
- Ellison, N. B., R. Gray, C. Lampe, and A. T. Fiore (2014). Social capital and resource requests on Facebook. *New Media & Society*, 16(7), 1104-1121.
- Ellison, N. and M. Hardey (2014). Social media and local government: Citizenship, consumption and democracy. *Local Government Studies*, 40(1), 21-40.
- Evarts, B. (2011). *Trends and patterns of U.S. fire losses in 2010*. Quincy, MA: National Fire Protection Association.

- Farquhar, L. (2013). Performing and interpreting identity through Facebook imagery. *Convergence*, 19(4), 446-471.
- Federal Emergency Management Association (FEMA) (2011). FEMA strategic plan fiscal years 2011 – 2014. Web. Retrieved March 1, 2015 from <https://www.fema.gov/media-library/assets/documents/25275>.
- Fugate, C. (2011). Understanding the power of social media as a communication tool in the aftermath of disasters. Written statement of Craig Fugate, Administrator FEMA, before the Senate Committee on Homeland Security and Gov. Affairs, Subcommittee on Disaster Recovery and Intergovernmental Affairs. Retrieved February 19, 2016. From <https://www.gpo.gov/fdsys/pkg/CHRG-112shrg67635/pdf/CHRG-112shrg67635.pdf>.
- Fleming, R. S. and F. X. Zhu (2009). Managerial responsibilities of the contemporary fire chief. *Journal of Global Business Issues*, 3(2), 57-68.
- Gottfried, J. and E. Shearer (2016). News use across social media platforms 2016. Web. Accessed May 28, 2016. From <http://www.journalism.org/2016/05/26/news-use-across-social-media-platforms-2016/>.
- Granito, J.A. (Ed.) (1988). *Managing fire services*. Washington, DC: International City Management Association.
- Griffith, E. (2016). Facebook users are sharing fewer personal updates and it's a big problem. Web. Accessed May 28, 2016. From <http://fortune.com/2016/04/07/facebook-sharing-decline/>.
- Gummerus, J., V. Liljander, E. Weman, and M. Pihlstrom (2012). Customer engagement in a Facebook brand community. *Management Research Review*, 35(9), 857-877.
- Hall, J. R., Jr. (2014). *The total cost of fire protection in the United States*. Quincy, MA: National Fire Protection Association.
- Halvorsen, K. E. (2003). Assessing the effects of public participation. *Public Administration Review*, 63(5), 535-543.
- Healy, J. F. (2012). *Statistics: A tool for social research, ninth edition*. Belmont, CA: Wadsworth.
- Hesse, B. W., M. O'Connell, E. M. Augustson, W. S. Chou, A. R. Shaikh, and L. J. Finney Rutten (2011). Realizing the promise of web 2.0: Engaging community intelligence. *Journal of Health Communication: International Perspectives*, 16(Sup 1), 10-31.

- Hjorth, L. and K. Y. Kim (2011). The mourning after: A case study of social media in the 3.11 earthquake disaster in Japan. *Television New Media*, 12, 552-559.
- Houston, J.B., J. Hawthorne, M. F. Perreault, E. H. Park, M. G. Hode, M. R. Halliwell, S. E. Turner McGowen, R. Davis, S. Vaid, J. A. McElderry, and S. A. Griffith (2014). Social media and disasters: a functional framework for social media use in disaster planning, response, and research. *Disasters*, 39(1): 1-22.
- Hughes, A. L., St Denis, L. A., Palen, L., & Anderson, K. M. (2014). Online public communications by police & fire services during the 2012 Hurricane Sandy. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1505-1514. ACM.
- Humphrey, B. (2016). Email correspondence. February 1, 2016.
- Kaid, L. L. and A. J. Wadsworth (1989). Content analysis in *Measurement of Communication Behavior*, P. Emmert and L. L. Barker, eds., New York: Longman.
- Kaplan, A. M. and M. Haenlein (2009). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, 53, 59-68.
- Karter, M. J. Jr. and G. P. Stein (2012). *U.S. fire department profile through 2011*. Quincy, MA: National Fire Protection Association.
- Keim, M. E. and E. Noji (2011). Emergency use of social media: A new age of opportunity for disaster resilience. *American Journal of Disaster Medicine*, 6(1), 47-54.
- Kweit, M.G. and R. W. Kweit (2004). Citizen participation and citizens evaluation in disaster recovery. *American Review of Public Administration*, 34, 354-373.
- Lachapelle, P. R. & S. F. McCool (2012). The role of trust in community wildland fire protection planning. *Society & Natural Resources: An International Journal*, 25(4), 321-335.
- Lacy, S. and D. Riffe (1996). Sampling error and selecting intercoder reliability samples for nominal content categories. *Journalism and Mass Communications Quarterly*, 73(4), 963-973.
- Lai, L. S.L. and W.M. To (2015). Content analysis of social media: A grounded theory approach. *Journal of Electronic Commerce Research*, 16(2), 138-152.

- Latonero, M. and I. Shklovski (2010). ‘Respectfully yours in safety and service’: Emergency management & social media evangelism. *Proceedings of the 7th International ISCRAM Conference, Seattle, WA, May 2010*.
- Lenhart, A. (2015). Teens, social media & technology overview 2015. Pew Research Center. Web. Accessed February 19, 2016. From <http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/>.
- Lin, C., L. K. Siebeneck, M. K. Lindell, C. S. Prater, H. Wu, and S. Huang (2013). Evacuees’ information sources and reentry decision making in the aftermath of Hurricane Ike. *Natural Hazards*, published online September 7, 2013.
- Lindell, M. K. and R. W. Perry (2012). The protective action decision model: theoretical modifications and additional evidence. *Risk Analysis*, 32(4), 616-632.
- Lindell, M. K., C. S. Prater, C. E. Gregg, E. J. I. Apatu, S. Huang, and H. C. Wu (2015). Households’ immediate responses to the 2009 American Samoa earthquake and tsunami. *International Journal of Disaster Risk Reduction*. Manuscript submitted for publication.
- Lombard, M., J. Snyder-Duch, and C. C. Bracken (2002). Content analysis in mass communication: assessment and reporting of intercoder reliability. *Human Communication Research*, 28(4), 587-604.
- Lovejoy, K. and G. D. Saxton (2012). Information, community, and action: How nonprofit organizations use social media. *Journal of Computer-Mediated Communication*, 17(2012), 337-353.
- McCaffrey, S. M. (2004). Fighting fire with education: What is the best way to reach out to homeowners? *Journal of Forestry*, 102(5), 12-19.
- McGee, M. (2013). EdgeRank is dead: Facebook’s news feed algorithm now has close to 100k weight factors. Web. Retrieved February 19, 2016. From <http://marketingland.com/edgerank-is-dead-facebooks-news-feed-algorithm-now-has-close-to-100k-weight-factors-55908>.
- McLean, H. and M. R. Power (2014). When minutes count: Tension and trust in the relationship between emergency managers and the media. *Journalism*, 15(3), 307-325.
- Merchant, R. M., S. Elmer, and N. Lurie (2011). Integrating social media into emergency-preparedness efforts. *New England Journal of Medicine*, 365(2), 289-291.

- Mergel, I. (2013). Social media adoption and resulting tactics in the U.S. federal government. *Government Information Quarterly*, 30, 123-130.
- Mergel, I. (2014). *A manager's guide to assessing the impact of government social media interactions*. Washington, DC: IBM Center for The Business of Government.
- Miller, T. I. and M. A. Miller (1991). Standards of excellence: U. S. residents' evaluations of local government. *Public Administration Review*, 51(6), 503-514.
- Mitchell, T., K. Haynes, N. Hall, W. Choong, and K. Oven (2008). The roles of children and youth in communicating disaster risk. *Children, Youth and Environments*, 18(1), 254-279.
- Murphy, M. (2013). Social media and the fire service. *Fire Technology*, 49, 175-183.
- Newsroom.fb.com (2016). Web. Retrieved February 19, 2016. From <http://newsroom.fb.com/company-info/>.
- Norris, D. F. and C. G. Reddick (2012). Local e-government in the United States: Transformation or incremental change? *Public Administration Review*, 73(1), 165–175.
- Obama, B. (2009). Transparency and open government: Memorandum for the heads of executive departments and agencies. *White House Blog*. Retrieved February 3, 2016. From https://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment, February 3, 2016.
- Olsen, C. S. and B. A. Shindler (2010). Trust, acceptance, and citizen–agency interactions after large fires: Influences on planning processes. *International Journal of Wildland Fire*, 19, 137–147.
- Parsons, A. (2013). Using social media to reach consumers: A content analysis of official Facebook pages. *Academy of Marketing Studies Journal*, 17(2), 27-36.
- Purposive sampling. (n.d.). Retrieved July 7, 2016, from <http://www.dissertation.laerd.com/purposive-sampling.php>
- Quarantelli, E.L. and R. R. Dynes (1977). Response to social crisis and disaster. *Annual Review of Sociology*, 3, 23-49.
- Rahimi, E. (2016). Email correspondence. January 27, 2016.

- Ramanadhan, S., S. R. Mendez, M. Rao, and K. Viswanath (2013). Social media use by community-based organizations conducting health promotion: a content analysis. *BMC Public Health*, 13(1129), 1-10.
- Runyan, C. W., S. I. Bangdiwala, M. Linzer, J. J. Sacks, and J. Butts (1992). Risk factors for fatal residential fires. *The New England Journal of Medicine*, 327(12), 859-863.
- Schurgin O’Keeffe, G., K. Clarke-Pearson, and Council on Communications Media (2011). The impact of social media on children, adolescents, and families. *Pediatrics*, 2011(127), 800-804.
- Sheil, A., M. T. Violanti, and K. Slusarski (2011). Explaining attitudes toward and experiences with social media among public information officers through adaptive structuration theory. *Communications of the IIMA*, 11(4), 51-72.
- Shen, B. and K. Bissell (2013). Social media, social me: A content analysis of beauty companies’ use of Facebook in marketing and branding. *Journal of Promotion Management*, 19(5), 629-651.
- Smith, A. (2015). U.S. smartphone use in 2015. Pew Research Center. Web. Retrieved February 19, 2016. From <http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/>.
- Spence, P. R., K. Lachlan, J. M. Burke, M. W. Seeger (2007). Media use and information needs of the disabled during a natural disaster. *Journal of Health Care for the Poor and Underserved*, 18(2), 394-404.
- Stipak, B. (1979). Citizen satisfaction with urban services: Potential misuse as a performance indicator. *Public Administration Review*, 39(1), 46-52.
- Stinson, L. (2016). Facebook reactions, the totally redesigned like button, is here. Wired.com. Web. Retrieved April 15, 2016. From <http://www.wired.com/2016/02/facebook-reactions-totally-redesigned-like-button/>.
- Swani, K., George M., and B. P. Brown (2013). Spreading the word through likes on Facebook: Evaluating the message strategy effectiveness of *Fortune 500* companies. *Journal of Research in Interactive Marketing*, 7(4), 269-294.
- Taylor, D. (2011). Everything you need to know about Facebook’s EdgeRank. *TheNextWeb*. Web. Retrieved July 1, July 2015. From <http://thenextweb.com/socialmedia/2011/05/09/everything-you-need-to-know-about-facebook’s-edgerank>.

- Tindall, D.B. and B. Wellman (2001). Canada as social structure: Social network analysis and Canadian sociology. *The Canadian Journal of Sociology*, 26(3), 265-308.
- Total number of websites. (n.d.). Retrieved April 08, 2016, from <http://www.internetlivestats.com/total-number-of-websites/>
- Van Dijck, J. and T. Poell (2013). Understanding social media logic. *Media and Communication*, 1(1), 2-14.
- Vivek, S. D., S. E. Beatty, and R. M. Morgan (2012). Customer engagement: Exploring customer relationships beyond purchase. *Journal of Marketing Theory and Practice*, 20(2), 127-145.
- Wagner, C., and A. Majchrzak (2007). Enabling customer-centricity using wiki the wiki way. *Journal of Management Information Systems*, 23(3), 17-43.
- Wallace, M. (2006). *Fire department strategic planning: Creating future excellence*. Tulsa, OK: PennWell Corporation.
- Walters, J. (2011). Firefighters feel the squeeze of shrinking budgets. *Governing*, January 2011, Web. Retrieved July 2015. From <http://www.governing.com/topics/public-workforce/firefighters-feel-squeeze-shrinking-budgets.html>.
- Wardell, C. III and Y. S. Su (2011). 2011 social media + emergency management camp: Transforming the response enterprise. Alexandria, VA: CNA Independent Research Funding, 1-56.
- Waters, R. D., E. Burnett, A. Lamm, and J. Lucas (2009). Engaging stakeholders through social networking: How nonprofit organizations are using Facebook. *Public Relations Review*, 35(2009), 102-106.
- Waters, R. D., R. R. Canfield, J. M. Foster, and E. E. Hardy (2011). Applying the dialogic theory to social networking sites: Examining how university health centers convey health messages on Facebook. *Journal of Social Marketing*, 1(3), 221-227.
- Waters, R. D. and K. D. Lo (2012). Exploring the impact of culture in the social media sphere: A content analysis of nonprofit organizations' use of Facebook. *Journal of Intercultural Communication Research*, 41(3), 297-319.
- Wu, H-C., Lindell, M.K., and Prater, C.S. (2015). Process Tracing Analysis of Hurricane Information Display. *Risk Analysis*, 35(12), 2202-2220.

- Wu, H-C., S. Arlikatti, A. Prelog, and C. Wukich, (In Press). Household response to flash flooding in the United States and India: A comparative study of the 2013 Colorado and Uttarakhand disasters. In M. Companion and M. Chaiken (Eds). *Understanding Vulnerability, Building Resilience: Responses to Disasters and Climate Change*. New York, NY: CRC Press.
- Zhang, W., T. J. Johnson, T. Seltzer, S.L. Bichard (2010). The revolution will be networked. *Social Science Computer Review*, 28(1), 75-92.

APPENDIX A

FIGURES

Figure A-1 Included Cities by Population.

1) New York City, NY	8,175,133	26) Cherry Hill, NJ	71,045
2) Los Angeles, CA	3,792,621	27) Santa Fe, NM	67,947
3) Houston, TX	2,099,451	28) Loveland, CO	66,859
4) Phoenix, AZ	1,445,632	29) Flagstaff, AZ	65,870
5) Austin, TX	790,390	30) Dubuque, IA	57,637
6) Boston, MA	617,594	31) Rogers, AR	55,964
7) Portland, OR	583,776	32) Casper, WY	55,316
8) Las Vegas, NV	583,756	33) Bartlett, TN	54,613
9) Oklahoma City, OK	579,999	34) Revere, MA	51,755
10) Sacramento, CA	466,488	35) Smyrna, GA	51,271
11) Virginia Beach, VA	447,021	36) Perth Amboy, NJ	50,814
12) Atlanta, GA	420,003	37) Richland, WA	48,058
13) Wichita, KS	382,368	38) Danville, VA	43,055
14) Cincinnati, OH	296,943	39) Fond du Lac, WI	43,021
15) Boise, ID	205,671	40) Dover, DE	36,047
16) Sioux Falls, SD	153,888	41) Fairbanks, AK	31,535
17) Surprise, AZ	117,517	42) Stevens Point, WI	26,717
18) Provo, UT	112,488	43) Auburn, ME	23,055
19) Clearwater, FL	107,685	44) Asbury Park, NJ	16,116
20) Arvada, CO	106,433	45) Norwalk, IA	8,495
21) Fargo, ND	105,549	46) Elk Lake, PA	3,436
22) High Point, NC	104,371	47) Montana City, MT	2,715
23) Clovis, CA	95,631	48) Surf City, NJ	1,205
24) Tuscaloosa, AL	90,468	49) Salisbury, NH	1,137
25) Longview, TX	80,455	50) Sunrise Beach, MO	431

Figure A-2 Numbers of followers by city (as of 2/1/15).

1) New York City, NY	300,054	26) Dover, DE	3,141
2) Boston, MA	119,957	27) Auburn, ME	3,044
3) Houston, TX	42,498	28) Flagstaff, AZ	2,925
4) Los Angeles, CA	16,174	29) Clovis, CA	2,604
5) Virginia Beach, VA	14,050	30) Asbury Park, NJ	2,560
6) Wichita, KS	9,249	31) Revere, MA	2,470
7) Austin, TX	8,177	32) Boise, ID	2,446
8) Tuscaloosa, AL	8,012	33) Danville, VA	2,184
9) Portland, OR	7,912	34) Smyrna, GA	1,875
10) High Point, NC	7,827	35) Dubuque, IA	1,834
11) Cherry Hill, NJ	7,719	36) Surprise, AZ	1,725
12) Phoenix, AZ	7,547	37) Perth Amboy, NJ	1,684
13) Cincinnati, OH	6,028	38) Longview, TX	1,634
14) Oklahoma City, OK	5,980	39) Fond du Lac, WI	1,629
15) Loveland, CO	4,442	40) Stevens Point, WI	1,574
16) Fargo, ND	4,331	41) Norwalk, IA	1,539
17) Arvada, CO	4,327	42) Richland, WA	1,155
18) Atlanta, GA	4,053	43) Santa Fe, NM	1,119
19) Sacramento, CA	3,938	44) Sioux Falls, SD	1,115
20) Rogers, AR	3,691	45) Sunrise Beach, MO	966
21) Bartlett, TN	3,493	46) Provo, UT	823
22) Casper, WY	3,380	47) Montana City, MT	662
23) Clearwater, FL	3,321	48) Salisbury, NH	645
24) Surf City, NJ	3,304	49) Fairbanks, AK	598
25) Las Vegas, NV	3,190	50) Elk Lake, PA	579

Figure A-3 Coding instructions for inter-coder reliability reviewers.

“There are three general types of posting categories: *disclosure*, *information*, and *involvement*.

Disclosure posts talk about the fire department and things it has done in the *near or distant past*. Sub-categories within *disclosure* posts discuss the department’s *history* - old apparatus/buildings, staff/members, and incident responses. They highlight every day moments within the fire department, coded as *fire department life*. These highlight members of the department, or give “behind the scenes” looks at department assets such as vehicles, equipment, and buildings. They release *activity recaps* of things the fire department was involved with, including recent incident responses, training, or organized community events.

Information posts share general content and tell community members/stakeholders about news or hazards that *could* affect them or the community. These are things that may be “happening now” or in the immediate future. Sub-categories of this content include general hazard safety *public service announcements*. These could be reminders to check your smoke detectors, or to water your Christmas tree, or include product recall information. These can share specific *situational awareness* information such as road closures, flooding, smoke conditions, or weather forecasts/alerts. They can also include *general information* that include non-fire department related community news, information about other communities, or information about the fire service in general, but not specific to that community.

Involvement posts include *direct interactions* between the fire department and stakeholders, and announcements about *things happening in the future*. Sub-categories include *physical involvement* content that looks for the public to show up at things – such as classes or events. They include *virtual involvement* content that looks for online interaction whether in the form of direct input on an issue, or something more fun such as contests or trivia questions. They also include *general engagement* posts that include “thank you” messages or holiday greetings or cute/funny pictures.

Certain posts will be challenging to code. They may include several different types of information. A post might discuss a motor vehicle accident response while also warning about icy roads. It may have a holiday greeting while reminding you to water your Christmas tree. It is important to determine the *main* point of the post.

Once classified, additional variables also need to be recorded. Does it contain a *video*? Videos can either be directly uploaded and playable within Facebook or shared via links from other video social media sites such as YouTube, Vine or Instagram. Certain content shares, such as those from news agencies, may include videos, but unless this is obvious from the post, those should just be classified as *links*. Any posts with direct hyperlinks to click on or pictures that lead to other sites should be classified as having a *link*.

Does it contain an *image* related to the content of post? This image can be directly shared by the fire department or one connected with a link. If it involves a link and shows a picture related to the content of the post, count that as an image. If it involves a *link* and only shows a picture of

the site it is linked to (i.e. a newspaper or CNN's logo), do not count that as an image. Certain posts will be pictures being added to previously created albums. If these albums were counted already during that month, the post will be categorized but engagement will not be recorded again. A profile picture change should be treated the same as a wall post with an *image*, as it will appear similarly on a timeline.

Shares from other Facebook pages should be counted if they contain the word "*shared*" or "*via*" at the top of the post."

APPENDIX B

TABLES

Table B-1 Inter-coder reliability for content coding (3 coders).

Average Pairwise Percent Agreement	Pairwise percent agreement columns 1 & 3	Pairwise percent agreement columns 1 & 2	Pairwise percent agreement columns 2 & 3
93.539%	92.511%	96.035%	92.07%

Average Pairwise Percent Agreement

Fleiss' Kappa	Observed agreement	Expected agreement
0.899	0.935	0.361

Fleiss' Kappa

Average pairwise CK	Pairwise CK columns 1 & 3	Pairwise CK columns 1 & 2	Pairwise CK columns 2 & 3
0.899	0.883	0.938	0.876

Average Pairwise Cohen's Kappa

Krippendorff's Alpha	N Decisions	$\sum_c o_{cc}^{***}$	$\sum_c n_c(n_c - 1)^{***}$
0.899	681	637	166940

Krippendorff's Alpha (nominal)

VITA

James R. Aleski

Candidate for the Degree of

Master of Science

Thesis: GETTING ENGAGED: FACEBOOK AND THE FIRE SERVICE

Major Field: Fire and Emergency Management Administration

Biographical:

Education:

Completed the requirements for the Master of Science in Fire and Emergency Management Administration at Oklahoma State University, Stillwater, Oklahoma in July, 2016.

Completed the requirements for the Bachelor of Science in Mass Communications at Emerson College, Boston, MA in December, 1996.

Experience:

Firefighter/EMT/Social Media Specialist, Cherry Hill (NJ) Fire Department, 2007-present.

Captain, Sayreville (NJ) Volunteer Fire Department, 1997-2009.

Freelance Film/Television Producer, New York, NY, 1995-2007.

Professional Memberships:

International Association of Fire Fighters (IAFF) / Cherry Hill
Professional Fire Fighters, Local 2663

Professional Fire Fighters Association of New Jersey (PFANJ)